MUNICIPAL JOURNAL

ISSUED WEEKLY

VOLUME XLV
No. 6

August 10, 1918

$3.00 a Year
10 Cents a Copy

GENERAL LIBRARY
Engineering Library
AUG 12 1918
UNIV. OF MICH.

Tarvia
Preserves Roads
Prevents Dust

Tarvia Road at Camp Douglas, Juneau Co., Wis.

Tarvia Road at Camp Upton, Yaphank, N. Y.

Tarvia Road at Camp Devens, Ayer, Mass.

Tarvia Road at Camp Dix, Wrightstown, N. J.

Tarvia Roads in U. S. Camps—

THE Government has built sixteen new camp-cities or cantonments for housing and caring for the new armies.

A cantonment is a miniature city of 40,000 inhabitants with the heaviest kind of traffic on the avenues.

Constant lines of automobiles, auto-trucks, mule teams, horses, artillery, and thousands of marching men fill the arteries of traffic. The road problems have been intricate and varied and above all speed in construction has been paramount.

Old types of roads, the corduroy and the dirt road, were not adequate to the needs of these camps. **Good roads had to be supplied** in order to keep the tremendous camp-traffic moving.

Many miles of Tarvia roads were promptly built and are now giving entire satisfaction—

First—because they are smooth, durable and water-proof.

Second—because they are neither dusty nor muddy.

Third—because they are quickly built, and are easy to maintain in good condition.

Fourth—because they are the most economical under the circumstances.

The use of Tarvia in these camps is an illustration of the versatility of the material and the service rendered by The Barrett Company.

The Tarvia was ready and the expert advice that went with it was put freely at the service of the Government.

Whether a road-binder, a dust-layer, a road-preserver, or a patching-material was needed, there was a grade of Tarvia to fit.

Illustrated booklet free on request.

The Barrett Company

New York, Chicago, Philadelphia, Boston, St. Louis
Cleveland, Cincinnati, Pittsburgh, Detroit, Birmingham
Kansas City, Minneapolis, Nashville, Salt Lake City, Seattle
Peoria, Atlanta, Duluth, Milwaukee, Bangor
Washington, Johnstown, Lebanon, Youngstown, Toledo
Columbus, Richmond, Latrobe, Bethlehem, Elizabeth
Buffalo, Baltimore

TRADE B MARK

THE BARRETT COMPANY, Limited: Montreal, Toronto, Winnipeg, Vancouver, St. John, N. B., Halifax, N. S., Sydney, N. S.

Table of Contents, Page 3

Index of Advertisements, Page 38

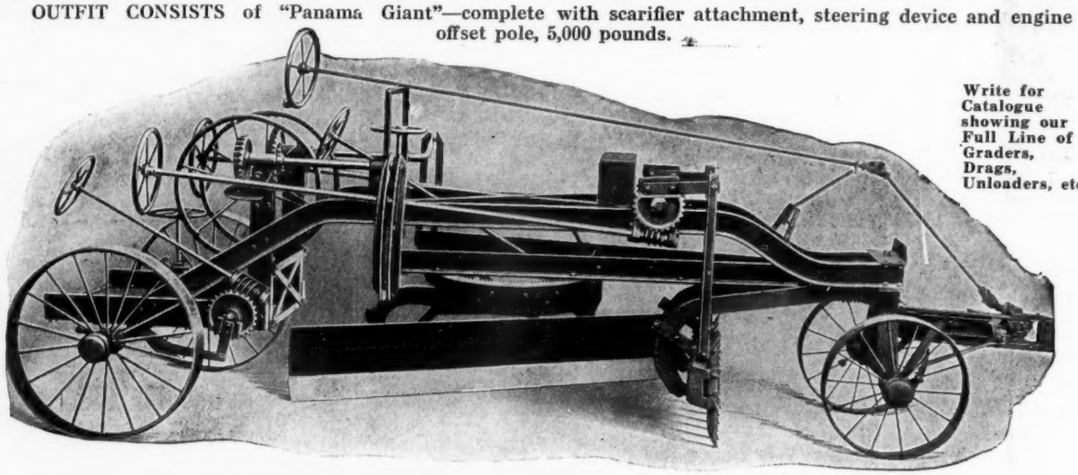
The **PANAMA LINE** *For Building and Maintaining Good Roads*

The "Panama Giant" with scarifier

MODERN ROAD BUILDING DEMANDS THE USE OF A LARGE AND STRONG MACHINE LIKE THIS—a combination of our regular "Panama Giant Grader" and the "Panama Scarifier," affording two very efficient machines at slightly more than the cost of one.

The grader or scarifier may be used separately or both at the same time if desired, an advantage afforded by no other machine.
With this machine the cost of resurfacing and grading is very small.

OUTFIT CONSISTS of "Panama Giant"—complete with scarifier attachment, steering device and engine offset pole, 5,000 pounds.



Write for Catalogue showing our Full Line of Graders, Drags, Unloaders, etc.

The **F. B. ZIEG MFG. CO.** FREDERICKTOWN, OHIO

First "Merriman" Plant (built 1905) Still in Operation

Hamilton, Ohio, December 19, 1916.
EAST IRON & MACHINE CO.,
Lima, Ohio.
Gentlemen:

In reply to your letter of December 16, 1916, asking what our experience has been with the "Merriman" one-car asphalt plant, we have had a "Merriman" one-car plant in use for twelve years and during that time it has turned out over 1,500,000 square yards of binder and top ready to lay. Its best asset is that it will run six days in a week. We have owned two "Merriman" plants since 1909, and they turn out from two to three hundred thousand square yards of material every season. Yours truly,

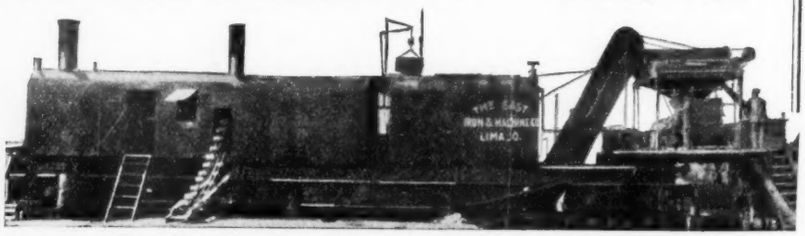
THE ANDREWS ASPHALT PAVING CO.,
W. N. Andrews, President.

Write for a list of users and ask them about the Merriman.

Read what its owner says after using the Merriman Plant for 10 years!! The recommendations of Mr. Andrews are verified by his purchase of a second plant.

The Merriman Steam Melting Plants are built as one car; Road Asphalt and Stationary Plants.

East Iron & Machine Co. **Lima, Ohio**



Can be laid on old macadam, concrete, old brick, rolled stone or slag foundations.
An Asphaltic Concrete Pavement with pulverized slag as chief mineral aggregate. An economical roadway of proved success.

BITOSLAG

Reg. U. S. Patent Office
The Pavement That Wears Like Iron
BITOSLAG PAVING COMPANY
90 WEST STREET, NEW YORK

Our experts will give full information as to the proper preparation of the mixture, and testing from time to time free of charge.

Correspondence invited.

WHERE "INDIAN" ROAD OILS ARE MADE. INDIAN REFINING CO., LAWRENCEVILLE, ILL.

Municipal Journal

Published Weekly by MUNICIPAL JOURNAL & ENGINEER, Inc., at 243 West 39th Street, New York

S. W. HUME, President. J. T. MORRIS, Treasurer and Manager. A. PRESCOTT FOLWELL, Secretary

Subscription Rates:

United States and possessions, Mexico and Cuba.....$3.00 per year All other countries .....$4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the act of Congress of March 3, 1879.

Volume XLV NEW YORK, AUGUST 10, 1918 No. 6

CONTENTS OF THIS ISSUE

Force Account Paving 103

Why St. Paul Department of Public Works favors this method after six years of satisfactory experience. Methods of estimating explained by the chief engineer of the department, **Oscar Claussen.**

Public Water Consumption 105

Amounts of water consumed for public buildings, street sprinkling, sewer flushing, etc., in Stockton, Cal.; South Manchester, Conn., and Lewiston, Ida.

Importance of Diameter of Deep Wells (Illustrated) 105

How diameter limits size and capacity of deep-well pumps used.

Federal Aid for Charleston, S. C., Water Works 107

Water Works Operation (Illustrated) 107

Repairing leaks and breaks in water mains and underground appurtenances. Prevention of leaks. Leaking valves.

Cost of Laying Iron Pipe 108

Unit figures for estimating cost under various conditions as to size, depth of trench and costs of material and labor.

Editorials 109

Force Account Work by Cities—Raising Gas Rates Painlessly.

The Week's News:

Roads and Pavements..... 113

Federal Approval for Paving Charges Against Railroads, Washington, D. C.—Road Damage by Trucks in Connecticut.

Sewerage and Sanitation..... 113

Passaic Valley Sewer Hampered by Delinquent Payments, Newark, N. J.—To Vote Bonds for Health Campaign, Meridian, Miss.—U. S. Public Health Service Fights Flies and Mosquitoes, Washington, D. C.

Water Supply 114

City Gives Neighbor More Water, Newark, N. J.—Breakdown of Pumps Closes Industries, Little Rock, Ark.—Commission's Right to Raise Rates Upheld, Sedalia, Mo.

Street Lighting and Power..... 115

May Not Increase Legislature's Gas Price, Albany, N. Y.—Seattle Wins $5,500,000 Improvement After Appeal.

Fire and Police..... 115

Five Firemen Killed in Grain Warehouse, Peekskill, N. Y.—Four Firemen Hurt at Factory Blaze, Newark, N. J.—Soldiers in Gas Masks Help Fight Fire, Stamford, Conn.—Strike of All Firemen Averted by Mediation, Salt Lake City, Utah—Fire Destroys Sixty Buildings, Clarksdale, Miss.

Government and Finance 117

New Capital Issues Committee, Atlanta, Ga. Higher Pay for State Employes, Albany, N. Y.—No Contract by Retiring Officials, Says Court, Wilkes-Barre, Pa.—City Employes Walk Out, Springfield, Mass.—State Commissions Want Federal Utilities Administration, Washington, D. C.

The Municipal Index..... 118

News of the Societies..... 120

Problems Cities Are Studying with Experts.... 120

Industrial News 121

Personals 122

Contract News 21

Northwestern Drum-Mixers

Write for Bulletin 31

NORTHWESTERN DRUM MIXERS

Unequalled for speedy, thorough, economical mixing. Simple design and sturdy construction assure years of trouble-free service. Engine equipped with Twin Service Carburetor burning either gasoline or kerosene. The lowest priced reliable drum mixer built. Costs less to buy; costs less to run. Get the facts about the "Northwestern" before you buy.

NORTHWESTERN STEEL & IRON WORKS
(Capital $200,000)
EAU CLAIRE, WISCONSIN

POWER TAMPING

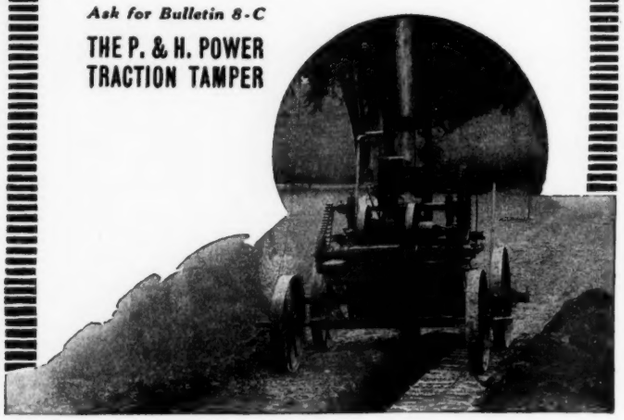
means

—permanent backfilling
—lower tamping costs
—faster and regular work

PAWLING & HARNISCHFEGER CO.
MILWAUKEE WISCONSIN

Ask for Bulletin 8-C

THE P. & H. POWER TRACTION TAMPER



Ransome CONCRETE EQUIPMENT

RANSOME CONCRETE MACHINERY CO.
1754 Second St., Dunellen, N. J.
Branches and Agencies in all Principal Cities

CUMMER ASPHALT PLANTS

All types and sizes

The F. D. Cummer & Son Co., Cleveland, O.

LITTLEFORD

Tar and Asphalt Heaters

The Proof of the Heater is in the Heating.

LITTLEFORD BROS.
451 East Pearl St., Cincinnati, Ohio

LEHIGH CEMENT

NATIONAL

DISTRIBUTION REPUTATION

Blueprints

The Wickes

Continuous Electric. Sells at half the price. Uses half the current of others. Perfect prints up to 48" in width and of unlimited length.

Wickes Bros.
Department E
Saginaw - Mich.

SERVICE FIRST!

IRONSTONE BLOCK

REPRESSED OR DUNN WIRE-CUT-LUG

Terre Haute Vitrified Brick Co., Terre Haute, Indiana

THE ELGIN

The machine that sprays, sweeps and collects.
Driven by a motor.

ELGIN SALES CORPORATION
New York Chicago

WYCKOFF PIPE & CREOSOTING CO.
30 East 42d St., NEW YORK
Send for Catalogue "D"

CREOSOTED WOOD BLOCKS

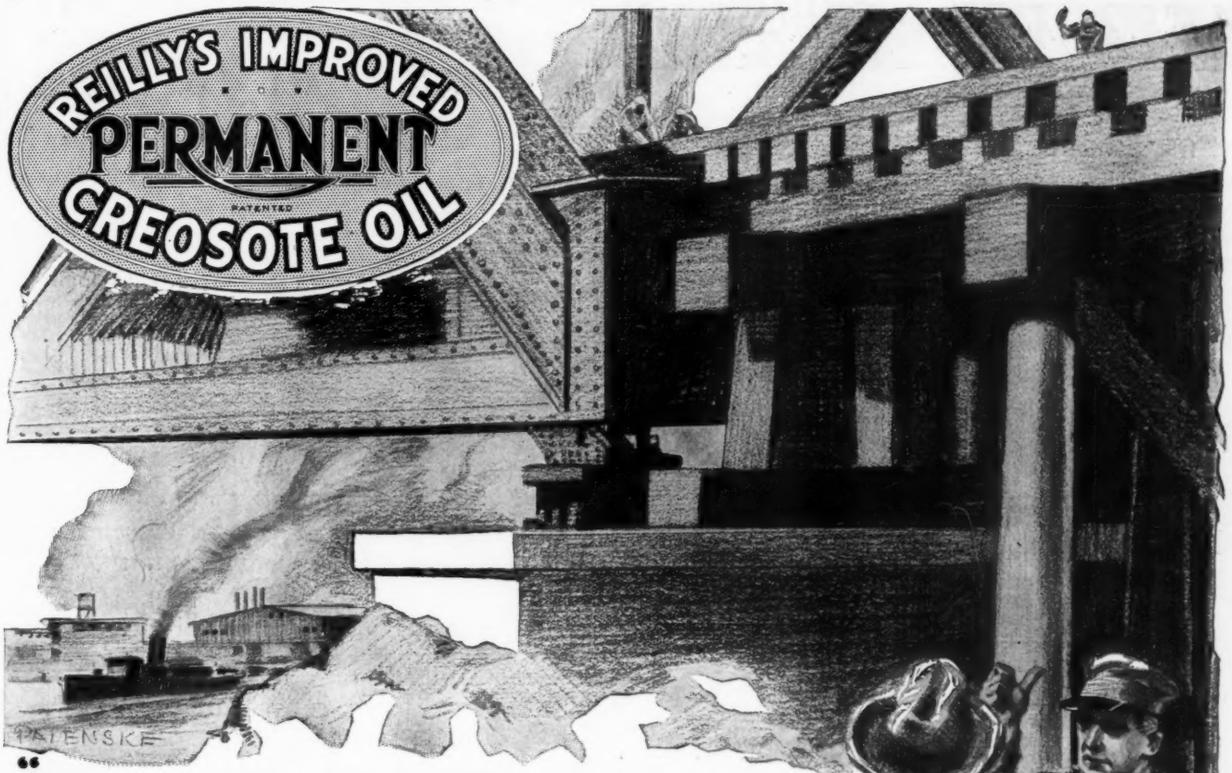
WYCKOFF WILL NOT BUCKLE OR DECAY

WYCKOFF CONDUIT for underground wires, and all forms of creosoted wood; also Wooden Water Pipe and Steam Pipe Casings. Creosoting Works and Factory: Portsmouth, Va.

A PROPOSAL

IN MUNICIPAL JOURNAL

"Reaches Most Bidders at the Least Cost"



"These Bridge Timbers can never fail through decay"

Reilly's Improved Creosote Oil is sure protection against timber decay. It is without a rival for the treatment of ties, bridge timbers, piles, etc., by the pressure process.

Because it contains three times as much permanent body as the next best oil —because it is free from pitch, coal tar and other adulterants—because it contains no volatile elements to evaporate or wash out—it is the best oil made for the permanent preservation of wood by pressure treatment.

Construction engineers and contractors everywhere recognize its superiority and specify **Reilly's Improved Creosote Oil.**

Republic Creosoting Company

INDIANAPOLIS, INDIANA

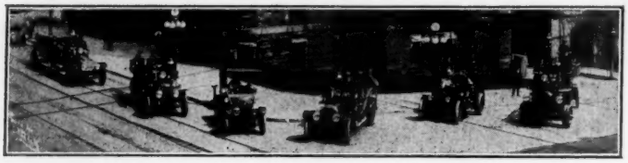
PLANTS: Indianapolis Minneapolis Seattle Mobile Norfolk

Performance is what Counts.

It isn't what we say our apparatus can do—it is what fire chiefs say our apparatus does.

Be it hill climbing, straight away, or pumping, American-La France motor fire apparatus can be depended upon to give the maximum performance when and where it counts most.

Years of experience building fire apparatus, years of experimental engineering applied to mechanical improvements, and superior workmanship have established a foundation on which American-La France records stand unshaken.



Jamestown, N. Y., Fire Department with American-LaFrance Equipment

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

Elmira, New York, U. S. A.

Member of the National Automobile Chamber of Commerce
Licensed under the Dyer Patents

BRANCH SALES OFFICES AND SERVICE STATIONS

New York Boston Chicago San Francisco Portland, Ore. Dallas
Los Angeles Atlanta Denver Pittsburgh Baltimore Minneapolis

Canadian Factory: Toronto, Ont.

Hotel Cumberland

New York, Broadway at 54th St.

Broadway cars from Grand Central Depot

7th Ave. cars from Pennsylvania Station

Modern and Fireproof

Strictly First Class
Rates Reasonable

ROOMS WITH ADJOINING BATH
$2.00 up
ROOMS WITH PRIVATE BATH
$2.50 up
SUITES
$4.00 up

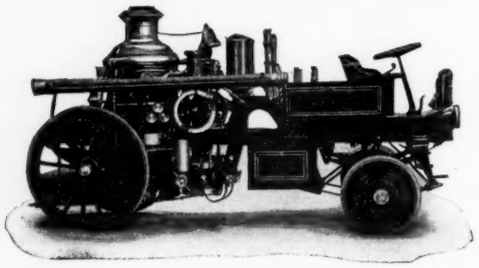
Ten Minutes' Walk to Fifty Theatres

— Send For Booklet —

HARRY P. STIMSON FORMERLY WITH HOTEL IMPERIAL

Only New York Hotel Window-Screened Throughout

TRACTORS AND AERIAL WAGONS



Four Wheel Drive—One Man Operation—Inquiries Solicited

Couple Gear Freight-Wheel Co.

485 Buchanan Avenue GRAND RAPIDS, MICH.

VITREOUS PORCELAIN ENAMELED IRON

STREET SIGNS
HOUSE NUMBERS
TRAFFIC SIGNS
SAFETY FIRST SIGNS
LICENSE TAGS

GUARANTEED AGAINST FADING, TARNISHING, RUSTING
HIGH QUALITY-REASONABLE PRICES-PROMPT DELIVERY

THE ENAMEL PRODUCTS CO.

CLEVELAND, OHIO

Loper Fire Alarm Company

STONINGTON, CONN.

Manufacturers of COMPRESSED AIR FIRE WHISTLES, WHISTLE BLOWERS, BELL STRIKERS, BOXES, GONGS, Etc., Etc.

ESTIMATES CHEERFULLY GIVEN.

DON'T KNOCK—

We are progressing. If you don't believe it, just apply and get a job running one of the new "Victory Motors," and if you LAND SAFE, drop us a line and say you are READY to place your order for the

MATHEWS DIRECTION STREET TRAFFIC **SIGNS**

White Plains, New York

COTTON RUBBER LINED
Wax and Para Gum Treated **FIRE HOSE**

MILDEW AND ROTPROOF

FABRIC FIRE HOSE MANUFACTURING CO.

Cor. Duane and Church Streets NEW YORK

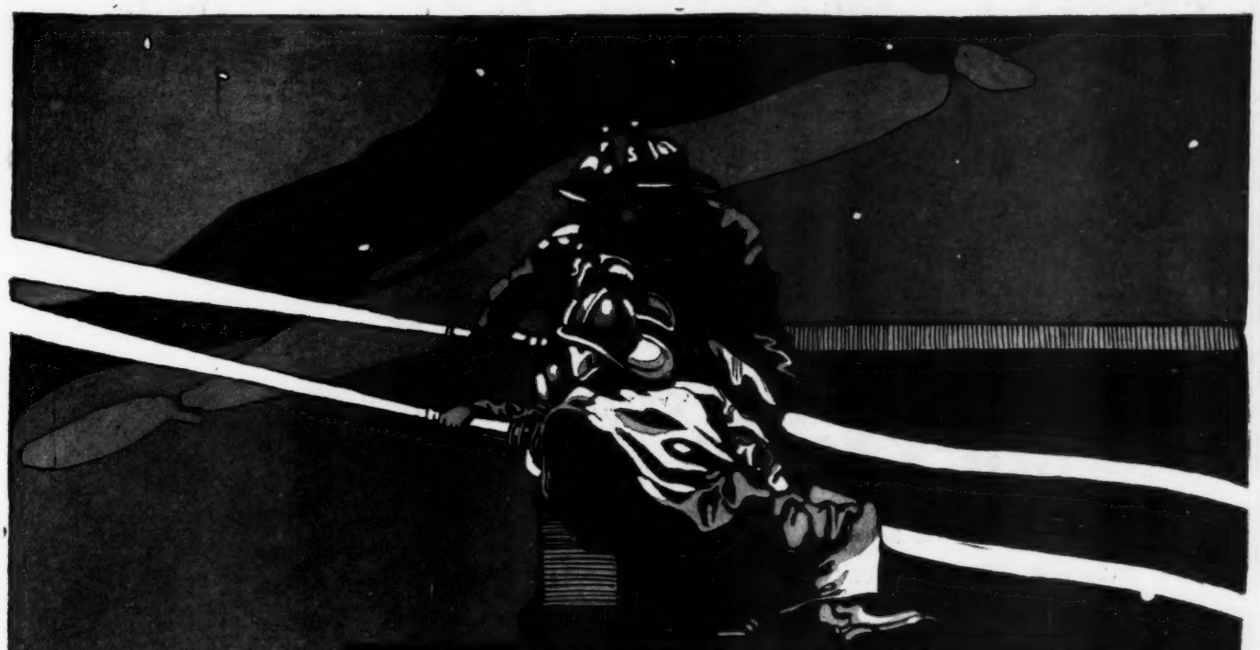
ADVERTISE YOUR CALLS FOR BIDS FOR MUNICIPAL WORK

in the live municipal weekly, and get more bidders and reduce costs.

Rate $2.00 an inch

MUNICIPAL JOURNAL

243 W. 39th Street New York



CONFIDENCE!

THE fireman on the roof feels far safer, has greater courage and senses the powerful backing of an unseen power when he has within his reach a hose he knows won't weaken at the fighting front—"WHITE KING" Fire Hose.

It has become the mainstay of many of our nationally known fire chiefs and every day other famous chiefs are sending in their orders.

A dozen re-orders from one large city is only one single proof of worth—and there are a "bushel of others."

Specify "WHITE KING" in your next requirement.

THE B.F.GOODRICH RUBBER COMPANY

Makers of the Celebrated Goodrich Automobile Tires—*"Best in the Long Run"*

The City of Goodrich AKRON, OHIO

W. S. S.

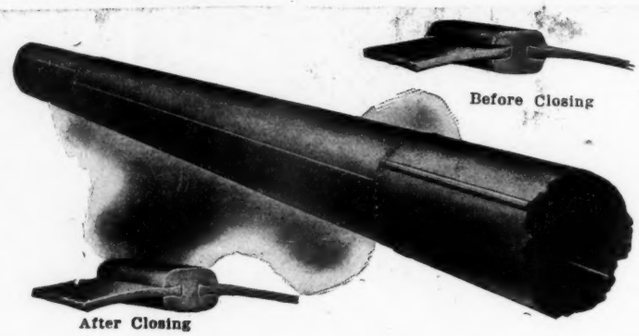
A purchased Thrift Stamp is a Soldier's Life Insurance Policy.

On sale at all Goodrich Branches

GOODRICH

"WHITE KING"

FIRE HOSE



13,000,000 People depend on LOCK BAR STEEL PIPE

And have never once been disappointed.

Cities with an aggregate of 13,000,000 population have pinned their faith to Lock Bar Steel Pipe.

They have capitalized both upon its service and economy features.

No citizen has ever suffered through Lock Bar Steel Pipe—it has never failed in service.

In addition the Lock Bar Joint is 100% efficient—it develops the strength of the full section of the plate.

Why not have us tell you more about the true economy of using Lock Bar Steel Pipe?

EAST JERSEY PIPE CORPORATION

Fulton and Church Sts., New York City Works: Paterson, N. J.

Manufacturers of

CAST IRON PIPE

BELL AND SPIGOT

FOR WATER—GAS—CULVERTS—SEWERS

Also Flexible Joint Pipe—Cylinders—Tubes, Milled and Plain Ends—High Pressure Fire Service Pipe—Special Castings. Flanged Castings a Specialty.

Quality and Service Guaranteed

FLANGED PIPE

Warren Foundry & Machine Company

Offices, 11 Broadway, N. Y. 201 Devonshire St., Boston, Mass.
Works, Phillipsburg, N. J.

THE FIRST CAST IRON PIPE EVER MADE IN THE WORLD'S HISTORY IS STILL IN SERVICE

SERVICE CAST IRON PIPE MEASURED BY CAST IRON PIPE CENTURIES

MORE THAN 250 YEARS OLD

The Cast Iron Pipe Publicity Bureau

1 BROADWAY NEW YORK

EVERLASTING SERVICE

The permanent PIPE and JOINT

UNIVERSAL CAST IRON PIPE

CAST IRON

STANDARD SIX-FOOT LENGTHS
LAID ANYWHERE WITHOUT CALKING

WRENCHES THE ONLY EQUIPMENT
GASTIGHT — FLEXIBLE — DURABLE

THE CENTRAL FOUNDRY COMPANY 30 WEST STREET NEW YORK

SALES OFFICES—NEW YORK, CHICAGO, ATLANTA, DALLAS, SAN FRANCISCO, KANSAS CITY, MO.
FOUNDRIES—BALTIMORE, MD.—LANSDALE, PENN.—NEWARK, N. J.—MEDINA, N.Y.
ANNISTON, ALA.—BESSEMER, ALA.—HOLT, ALA.—VINCENNES, IND.

Is Your City Mentioned in This Issue of Municipal Journal?

If not, does this mean that it isn't a live city—or that you haven't sent us the story of what your city is doing now? Send us all news—of contracts, of proposed work, annual reports—long items—short items—anything of interest.

Every time your city's name appears it is getting valuable publicity and you are helping the cause of better city administration all over the country.

Municipal Journal

Volume XLV. NEW YORK, AUGUST 10, 1918 NO. 6

FORCE ACCOUNT PAVING*

Why It Is Favored by St. Paul Department of Public Works—Results Obtained by That Department During Past Six Years—Conditions Affecting Estimating Cost of Work.

By OSCAR CLAUSSEN †

The taxpayers in 1912 demanded that the Department of Public Works of St. Paul do its paving by city force account, having the idea that paving by contractors in previous years had been done poorly and large profits made in it. Barring some individual jobs, this idea was erroneous. As a general rule the contractors had laid the pavements well and substantially and in accordance with specifications, and their profits had not averaged more than 10 to 15 per cent. Such profits are not exorbitant, it being generally conceded all over the United States that they are not more than contractors should be entitled to. But 10 to 15 per cent profit applied to the cost of pavements laid in St. Paul during the last six years, $2,480,000, gives a sum large enough to maintain the Department of Public Works during that period.

Realizing this condition of affairs in 1912, the opportunity of doing force-account paving was grasped with enthusiasm, but with a mind fearful of what the practical results might be. Beginning with three paving jobs in 1912, the department has executed as high as 15 jobs in one year. Out of a total of 59 paving jobs executed during the last six years, 32 were done in competition with the lowest bids received from contractors, and in each and every one of these 32, the actual cost of pavement was less than contractor's lowest price bid. While in some cases the percentage of saving was very small, others were done where the contractor's lowest bid was 15% to 25% higher than the actual cost of the pavement laid, the average of all jobs laid in competition being approximately 10%.

ESTIMATING COST OF WORK.

One of the most important operations involved in connection with force account pavement is the making and securing, as far as it is possible to do, accurate estimates of cost, as these, of course, are the determining element in deciding, after bids are received, whether to let the work by contract or proceed to do same by force account.

Contrary to the belief of at least a large portion of the public, it is not possible for any engineer to figure or predetermine the exact cost of any piece of engineering work. Such an engineer has not yet been discovered and never will be. The engineer never gives the cost of the work, all he does and can do is to give an estimate of the cost, his estimate of cost being more or less close to the actual cost in accordance with the experience, thorough knowledge and judgment he has about the particular kind and nature of the work to be performed. If the actual cost gets within 5% of the estimated cost, any engineer will consider it a lucky performance. If it were possible generally to predetermine the exact cost of engineering work, or even within 5% of the actual cost, contract work would be done only in exceptional cases. However, on some work it is much easier to make a fairly close estimate of cost than on other work, as will be shown.

The two items of an estimate of cost are labor and material. The quantity or amount of material for a piece of engineering work is generally quite definitely called for and prescribed in plans and specifications, and therefore the cost of same can be quite accurately ascertained; but the labor, the second item of cost estimate, cannot be readily predetermined and is very difficult to figure accurately. Therefore, on all engineering work where the percentage that cost of materials is of the total cost is large and the percentage of labor is small, it is quite possible to make a fairly accurate estimate of cost; and, on the other hand, where the percentage of labor is large and the percentage of material small, it is much more difficult to furnish an estimate of cost approximating the actual cost.

Now, on paving work the cost of the material amounts to from 70% to 80% of the total cost, while the labor cost amounts only to from 20% to 30% of the total cost. Particularly is this true with block pavements, such as brick, sandstone or creosote block. Therefore it is possible to arrive at fairly close actual cost figures of pavement work, both the quantity of material and the price of same being definitely known and constituting 80% of the total cost, while the amount of labor is not definitely known but constitutes only 20% of the cost. For example, suppose the cost of finished pavement is estimated at $3.00 per square yard. Of this amount, say 80% or $2.40, constitutes the cost of material and is within very narrow limits definitely known, while 20% or 60 cents per square yard of finished pavement constitutes the cost of labor not definitely known and liable to vary greatly. Now, after the pavement is finished, we find that the labor item has been 50% more, or 90 cents per square yard, and the actual cost of pavement per square yard is $3.30 instead of $3.00; that is, while the item of labor was increased 50% over the estimate, the cost of complete pavement was increased only 10%.

The above explanations are made for the purpose of showing that it is in fact possible for the engineer, with proper experience, to give an estimated cost of a paving job that approximates closely the actual cost. The engineer is in a position to know, within reasonable limits, what a pavement will cost and therefore, in a given case, can figure in competition with a contractor whether he can do the work and save money over the contractor's figures or not. In other words, the risk and chances of estimated cost being largely exceeded are very small. Therefore, because all elements entering into the cost of

*From paper before the Engineers Society of St. Paul.
†Chief engineer, Department of Public Works, St. Paul, Minn.

the work are fairly well known, and we know, within reasonable limits, what the actual cost of a pavement will be (barring accidents or mistakes, which may and do happen once in a while), we are in favor of force-account work on paving.

This reasoning does not hold good with sewer or grading work, which are the classes of municipal work next in importance and amount. For instance, in sewer work the labor cost, which is the element of uncertainty, amounts to from 60% to 70% of the total cost for sewers up to 20" diameter and constitutes about 40% for sewers as large as 4' or 5' in diameter. If we should find, on a sewer job estimated at $20,000 ($13,000 for labor and $7,000 for material), that the labor item overran our estimate 50%, the sewer would cost $26,500 or about 33% more than estimated. With that happening we would be left in a fine predicament to explain the assessment figures to interested property holders.

An additional element of uncertainty as to cost of sewer work is the unknown nature of the ground and the possible presence of water, quicksand, boulders or rock. Therefore, sewer work, whether done by force-account or contract, is a mere gamble as to cost. Contractors largely guess at the cost and sometimes guess right and frequently wrong.

With grading work similar conditions prevail. While the labor item on grading work generally constitutes 100% of the cost and therefore is uncertain, the nature of the ground is not quite as uncertain as prevails with sewer work.

Therefore, because the cost of sewer and grading work cannot be ascertained and predetermined within reasonable limits; because, in other words, the element of risk is too great, the department is not in favor of doing sewer and grading work by force account.

OTHER CONDITIONS AFFECTING CHOICE.

Other reasons for favoring force-account paving are as follows: It has already been stated several times that the main element of uncertainty in the cost of engineering work is the labor cost. Where the nature of the work is such that it will admit of employing laborers in squads under a competent foreman, all laborers working together as a unit to accomplish a cohesive piece of work, and where it is impossible for the individual laborer to shirk his allotted quota, where each man must do as much work as the best in the gang and where the best man necessarily sets the pace, work can be done more cheaply and more can be accomplished than on such work where each individual does some work different from the others, where he does some separate job by himself, where one man's work does not directly affect the other man's work; in other words, where there is a chance for an individual to loaf on the job. On paving work the men largely work in squads. To begin with, there is the grading crew, then comes the concrete crew and then the block laying crew or the asphalt crew on asphalt work. Each man in his crew must work like a link in a chain, all doing equal amounts of work and if one link breaks the entire operating mechanism is thrown out of gear. Laborers appreciate that this cannot be and is not tolerated and in fact do not ask for it. It also necessarily means, in the nature of things, that strong husky men must be employed, men that can accomplish a day's work. In this manner very efficient work is accomplished on paving work operations in contrast to a good many other municipal operations.

Another reason why the Department of Public Works favors force-account paving is that, on the whole, better work can be secured. It is not because contractors attempt deliberately to skimp the work. It is not intended to make this charge. However, contractors do rely and have a right to rely on the city's inspectors to watch the work and see that it is properly done. For the securing of good workmanship, the city must necessarily rely on various inspectors, more or less competent. Such men as the city can secure have at best only a limited knowledge of paving requirements, they are men whose technical qualifications are not of a high degree with reference to construction of pavements and whose salaries are low and whose employment is of a temporary and shifting nature. These inspectors cannot be employed throughout the year and their services are needed only for a few months through the summer season and each season a large number of new inspectors are employed. Men of special knowledge and experience who can command and get adequate salaries, cannot, except in rare cases, be secured by the city under above conditions.

Another element in favor of force-account work is the fact that the department keeps a very close cost record of all the labor operations carried on, as well as of the constantly varying costs of material, and in this manner valuable cost data are constantly at our disposal, allowing us to keep a close check on any bids submitted by contractors with reference to the profit figured in the job. Thus the contractor is always compelled to figure his work with a small margin of profit and submit a low bid. In this way, even if the work is done by contract, it is done at a lower figure than it would be done by competition with force account eliminated.

REASONS FOR FAVORING FORCE-ACCOUNT PAVING.

The primary reason, however, for the Department of Public Works favoring force-account paving is the belief that a large saving in the cost of the work can be accomplished. The department does not, by any means, favor that all pavements should be laid by force-account. Each individual paving job should be considered by itself. At times the city may not have the proper organization at its disposal, at times it may not have the proper equipment readily available, or it may have more work to do for periods than can be conveniently handled. Also the contractor may have made a mistake in bidding, for some reason or another, a lower figure than the department has estimated the cost of the work. At times the contractor's judgment as to the cost of the work may vary considerably from that of the engineer, and where this judgment dictates a figure considerably lower than the engineer's figure, ordinary prudence should demand that the work be performed by the contractor.

The Department of Public Works has never claimed that in all cases paving work could be done more cheaply by force-account. Being just mere human beings, it is certain that in some cases the engineer's judgment will be at fault and the cost of a paving job will be more than the contractor's lowest bid price. Particularly is this true at the present time when prices on material are varying from week to week and the element of labor expense is almost impossible to take into account adequately.

To date, the Department of Public Works has executed 32 paving jobs in competition with contractors' lowest bid prices, and in each and every case a saving has accrued, the total saving on these 32 jobs amounting to $73,000 exclusive of depreciation charges. During the years 1913 and 1914 all paving work was ordered done by force account by the Council without receiving bids from the contractors, and therefore on the 26 jobs executed in 1913 and 1914 by force-account a comparison of contractors' bids cannot be made. However, the work done in 1914 comprised the largest program in paving ever carried out in this city in any one year, the cost amounting to $760,000, equal to 23½ miles on the basis of a 27-foot roadway.

Carrying on force-account means to the department the expenditure of a large amount of energy over that required to carry on contract paving; also it means a great deal of worry. We have always felt that, if we could not beat the lowest contractor's bid price, we would be subjected to a considerable amount of criticism by the public. We have never felt that it was possible to go along and do job after job against the lowest contractor's bid and beat him to it. It should be clear to everyone that such a task is absolutely impossible, and if it does happen, would be a miracle.

It is of course impossible to prove absolutely that force-account is cheaper than contract work. If it could, there would be no controversy whatever about the proposition. All that can be done is to present circumstantial evidence from data, arguments, past experience and actual results. In my judgment, contract paving, as a fixed policy, cannot be justified unless it is admitted that contractors will do work without a profit, and it would not be consistent or reasonable to assume that.

PUBLIC WATER CONSUMPTION.

Probably no subdivision of the water consumption in the various cities of the country is known less accurately as to amount than that used for public purposes, such as schools and other public buildings, street sprinkling, sewer flushing, etc. One reason for this is that many cities that meter all private consumers think it unnecessary to meter water used by the city itself, since no charge is made for this. A small but increasing number of cities, however, are metering such consumption, realizing that the information so obtained is important. Results from three cities are presented below.

In Stockton, California, in the year 1917, such public use amounted to about 5 per cent of the total amount pumped, the total sum used being 85,223,459 gallons. Of this amount 16,085,000 gallons was used by schools, 21,011,214 for street sprinkling, 33,413,948 for sewers and street flushing, and 14,715,297 was used in the parks. The amount used for sewer flushing was nearly uniform throughout the year. That used for flushing streets showed more variation, but averaged only about 2 per cent of that used for sewers. The small amount used for streets is accounted for by the fact that most of the streets are provided with asphalt or bituminous surfaces, which are swept with street sweepers.

We have several times referred to the waste of water by schools, due in many cases to the fact that fixtures are allowed to run continuously. The Stockton records show that during July, August and September as much water was being used by the schools as the average for the remaining months of the year, which may be partly accounted for by some such condition, although of this we are not informed, and it may be that the greatest part of this use was for keeping up lawns and other vegetation around the school buildings. The amount used in the schools averaged, for the entire year, 0.27 cubic feet per capita per day, or (if 17 per cent of the population attends school, the average for that section of the country) this amount to about 4.5 cubic feet (34 gallons) per pupil per day.

In South Manchester, Conn., the consumption in five school buildings last year varied from 0.82 cubic feet per pupil daily to 4.0 cubic feet. For three successive years the consumption per pupil in one school was 0.86, 0.82, and 0.61 cubic feet respectively; in another school 3.2, 2.0 and 1.5 cubic feet; and in a third school 4.0, 3.6 and 4.0 cubic feet respectively. For the fourth school only two years' records were given, these being 4.0 and 3.9, while for the fifth school the consumption was 2.1 for each of the two last years. The superintendent informs us that the low consumption for the school standing first in the above statement is due to a better system of flushing. The school whose record is 4.0 and 3.9 has the same total number of fixtures but the smaller number of pupils accounts for the higher rate.

In South Manchester no public service other than schools is metered, except one horse trough, and this showed a reduction of 20 per cent when a meter was placed on it and the city charged for the service. The present consumption of this trough is about 160 cubic feet daily.

In Lewiston, Idaho, the water department receives no payment for public water used by the city, although it is supplying about 20,000,000 cubic feet of water to the municipal departments. Last year the use for the several public purposes were as follows: fire protection, 287,000 cu. ft.; drinking fountains, 300,000 cu. ft.; park fountains, 793,000 cu. ft.; sewer flushing, 5,327,000 cu. ft.; city buildings, 160,000 cu. ft.; city parks, 983,000 cu. ft.; city cemetery, 695,000 cu. ft.; street parkings, 3,000,000 cu. ft.; street sprinkling, etc., 5,239,000 cu. ft.; free water, 3,100,000 cu. ft.; cleaning sewers, 500,000 cu. ft.; giving a total consumption for this use of 20,384,000 cu. ft.

IMPORTANCE OF DIAMETER OF DEEP WELLS

Where Deep-Well Pumps Are Used, Diameter of Well Limits Size of Pump—Lower Part May Be of Smaller Diameter.

The cost of pumping water comprises overhead charges and operating costs, and the latter includes wages of operators as well as cost of fuel or current used for power. In general the cost of power varies inversely as the fixed charges for plant, since greater cost of plant is generally incurred for the purpose of decreasing operating cost. As the unit cost of power (per ton of coal, gallon of oil, or kw. h. of current) has increased greatly of late, the importance of increased efficiency has increased similarly.

The appliances available for pumping from deep wells show lower efficiency than those used for surface pumping; that is, the cost for fuel or power per unit of work performed (gallon of water raised one foot) is greater. It therefore behooves those designing or building deep-well plants to give greater weight than heretofore to efficiency of operation in selecting the pumping machinery.

The first cost of a deep-well plant includes that of both well and pumping equipment, and the cost of a well increases rapidly with its size. But on the other hand, the efficiency of the pump increases with the size of the well. The air lift will generally get more water out of a small well (4 to 10-inch) than any form of deep-well pump. But on the other hand, its efficiency is very much lower. For example, a plant near New York using more than seven million gallons of water a day is using both air-lift and deep-well pumps in 8-inch wells, two wells for each, and finds that the cost of operating the air lift wells is about four times that of operating the two pumps.

But to secure the full advantage of the deep-well pump, the well must be made large enough; for the capacity of such a pump is limited by the diameter of the well. The size of the cylinder or working barrel that can be

inserted in an artesian well is the determining factor that governs the capacity of any deep-well pump.

Regardless of the depth of the well, be it 200 ft. or 1,000 ft., the water in it will usually rise to 100 to 150 ft. below top of well and will remain somewhere near this level under the greatest pumping that can be done by a deep-well pump or by air. There are, however, deep-well pumps in operation many years in which the cylinder, or working barrel, is below the 500 ft. level. The length of the rods, as well as the quantity of water lifted, determines the speed of the pump and this speed can be adjusted by a change in gears or pinions. It is manifestly clear that, given all the water a pump can lift, a well 18 in. diameter will yield more water than a well 6 in. diameter, and that more water will percolate into the larger than into the smaller hole.

A wide river will carry more water than will a narrow brook. There are many wells that will yield 500 to 1,000 gallons per minute from the 100 ft. level. If the diameter of the well is 6 in., the largest working barrel than can be installed is 4¼ in. diameter. Any deep-well pump equipped with a cylinder of this diameter, and operated at a normal and safe speed, will not deliver over 60 gallons per minute. If the well were 18 in. diameter, a 14-in. cylinder could be installed in it and a good deep-well pump would lift 1,000 gallons per minute under the same conditions. The cost of pumping 1,000 gallons would be approximately the same with both pumps; if there should be any difference in cost it would be in favor of the larger pump.

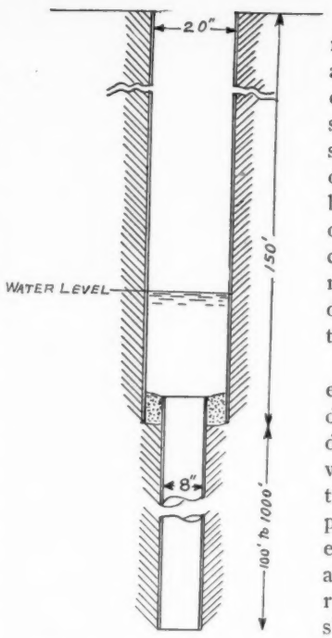


Fig. 2.—After 8" pipe has been sunk to desired depth inside the 20", it is cut off several feet above the bottom of the 20" and the space between the pipes filled with cement.

In order to make clear the reasons why the diameter of a well regulates the capacity of a deep-well pump, we submit the accompanying sketches showing the largest diameter cylinder that can be inserted in artesian wells of various diameters. The cuts also give the average maximum capacity of a deep-well pump installed on these various wells.

It would be entirely too expensive to sink a large-diameter pipe to the lowest depths of some very deep wells and it is not necessary that this be done. The ideal plan is to sink a large-diameter pipe down to a point above which the water will rise, even if the supply should come from the lowest depths of the well. When this has been done, a smaller pipe can be driven inside of the larger pipe and through the bottom of same.

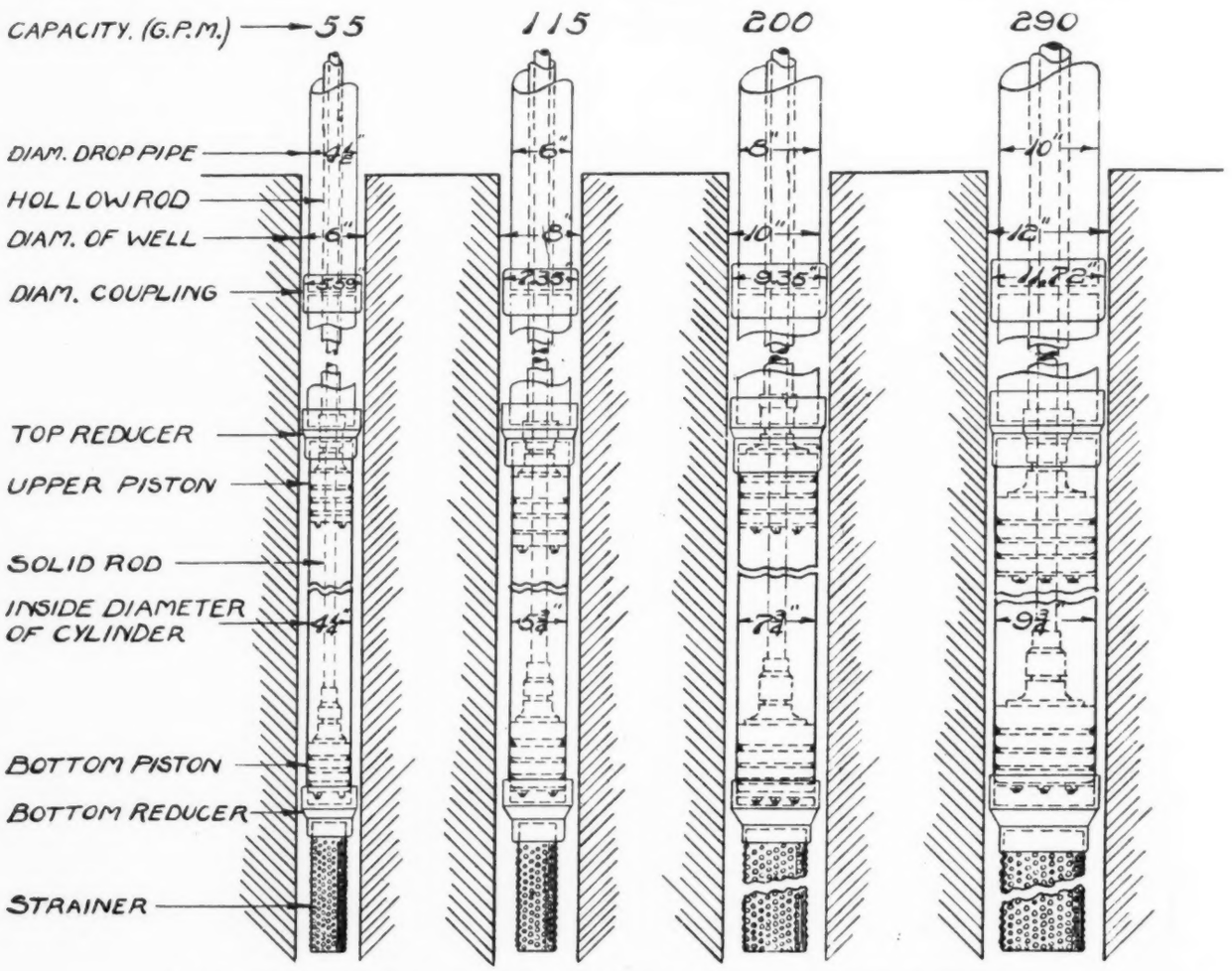


FIG. 1.—HOW SIZE OF WELL LIMITS CAPACITY OF PUMP TO BE USED THEREIN.

When the smaller pipe reaches the water bearing stratum, the water will rise above the top of the small pipe and into the large pipe. The smaller pipe should be cut off a short distance above the bottom of the outside or larger pipe and the space between the two pipes at this point can be cemented, so as to prevent surface water, sand, etc., from entering the space between the two pipes. We append hereto a sketch that illustrates this point:

The difference in cost between, say, a well 8 in. in diameter and 500 ft. deep and a well of the same depth, with the first 150 ft. 14 in. in diameter and the remaining 350 ft. 8 in. in diameter, would be the difference between the cost of the two pipes, and the difference in cost of drilling; but these differences would be very small indeed, relative to the advantages, should the well prove to be a good one and a great quantity of water be available and wanted at a low cost. If a well is drilled in rock, then the first 150 ft. should be, say, 14 in. and below that level it can be of any smaller diameter desired.

The first 150 ft. of any well, be it large or small diameter, in which it is intended to use a deep-well pump with cylinder at 150 ft., **must be straight,** as it is not feasible to successfully operate a deep-well pump in a crooked well. If a well is crooked or out of plumb, a pump cannot be used successfully in it, but the air lift must be employed.

In the great majority of cases the well men are directly responsible for the drilling of wells of small diameter because they are unable to drill larger wells. This is due to the fact that wells of 10 in. and larger diameter require much larger and better drilling machines, heavier tools, etc., than the average well man is provided with. The difference in cost of the two outfits is very considerable and the larger is beyond the means of the average well driller, who finds the demand for large wells is limited (owing largely to his own personal advice to his constituents), hence his investment in a smaller machine. A small machine might sink a 10-in. well to the 100-ft. depth, but the chances are that it would not be straight; and such a machine would be incapable of drilling a large-diameter well to any useful depth.

The well is the starting point of a water works system that draws its supply from artesian wells, and it is of the utmost importance that the diameter of the well be carefully considered, and that, if it be desired to take advantage of the efficiency of deep-well pumps, the diameter be sufficient to accommodate a size of cylinder adequate to lift the quantity of water desired.

Federal Aid for Charleston, S. C., Water Works.

In order to meet the growing demands of the Army and Navy, the War Department has authorized the expenditure of $250,000 as its share of the total cost of necessary additions to the water system of Charleston, S. C. The Navy Department has signified its willingness to join the War Department in an equal sharing of the cost. Under the terms of a contract the commissioners of public works of the city of Charleston propose to reimburse the Government for 75 per cent of the total cost of such additions by deducting 50 per cent from the total charge on monthly bills to be rendered and applying such deduction to the payment to the Government of the agreed purchase price of such additions. The city could not make the additions at its own expense and asked the cooperation of the Government.

WATER WORKS OPERATION.

Repairing Leaks and Breaks in Water Mains and Underground Appurtenances—Preventing Recurrence of Leaks—Leaking Valves.

In repairing leaks and breaks in mains, valves or other underground appurtenances of the distribution system, the first and frequently most expensive feature of the work is excavating to the points to be repaired. It is generally impracticable and uneconomical to use any kind of excavating machinery in this work because of the small opening that is required. Ordinarily it is a matter for pick and shovel only, unless a leak has already washed out the opening.

It is, or at least certainly should be, the aim to prevent a recurrence of the leak or break at that point, and consequently effort should be made to learn, if possible, what occasioned it. A great many minor leaks are apparently due to poor running or caulking of the joint, but even in such cases the actual starting of the leak may have been caused by a settlement of the pipe; and it is believed that in many cases such settlement has caused leaks in good joints. This settlement may have been due to insufficient tamping of earth under a joint or to the presence of quick sand or other yielding material under the pipe. If the latter was the cause, the settlement of the new joint is sometimes prevented by driving posts or light piles one on each side of the joint and nailing a cleat across them just under the pipe, these posts being driven down to hard bottom, for which purpose the water jet can be used to advantage. If there is no firm soil within practicable distance, local settlement can sometimes be prevented by putting an 8 or 10-foot plank under the pipe with the joint about at its middle.

Possibly a more common cause of leaking, and certainly a common cause of breaks in pipes, is so laying a pipe line that it is supported at intervals by jutting points of rock, by sewers or other underground structures on which it rests directly, while the intervening portions of the pipe are supported on more or less yielding soil, or is in direct contact with the under side of such structure, which may itself settle and cause a break. Such construction is liable to result in unequal settlement of the pipe, and in many cases in the breaking of a pipe where a single pipe was supported at the middle and forced down at the ends by the weight of the backfillings or was supported near the ends and forced down in the middle.

Where it is found that a leak or break has been caused by such conditions, the repairs should not be considered complete until the cause has been removed. This would mean the breaking off of the points of rock so that at least four to six inches of sand or gravel can be packed in between the pipe and the rock at every point; or the raising or lowering of the pipe where it rested upon another structure so that a similar depth of earth would separate the two.

In repairing a leaky lead joint, if there appears to be plenty of lead in all parts of the joint and the leak is small, the ordinary remedy is driving back the lead and caulking it up more thoroughly. If the lead appears to be too thin at some points, this is sometimes remedied by driving it well back into the bell and poring in new lead. The more common practice, however, is believed to be the use of lead wool for building up the thickness of the lead at any point. In applying lead wool, the lead in the joint is first driven back as far and as hard as possible and wool is then applied, a few strands at a time, each application being thoroughly caulked until it forms into a homogeneous mass with the lead in the bell. This takes some time and considerable muscle, but when prop-

erly done appears to give a most satisfactory joint. Where the leak is through a small pin hole in the lead or between the lead and the iron, this may be reamed out slightly and a plug of cold lead pointed at the end and driven into the hole, the plug and the lead around it being set up hard and thoroughly with a caulking tool.

Where the joint appears to be poor over at least 1/3 of the circumference, probably the best plan is to remove the lead altogether and make a new joint. Removing the lead may be accomplished either by melting it out or by cutting it out. The latter is generally the more difficult method, and melting is commonly resorted to. The old plan of melting out a joint was to dig a hole under the bell and build a wood fire there. This requires considerable time, especially if the pipe is large, is apt to cause objectionable smoke in the street above and becomes especially difficult where there is water in the trench, which is apt to be the case where the ground has become water soaked because of an old leak or a break. A preferable plan is to melt out the joint by the use of a gasoline or kerosene torch, such as is used by railroad men for thawing out frogs and switches; or, for small joints, a large-sized painter's torch may be used; while for the larger joints special blow torches can be obtained, manufactured expressly for such purposes.

Where leadite is used, this may be melted out, but a number of superintendents have found it easier to cut out such a joint than to melt it, reporting that it cuts easily, while it requires more heat for melting than does lead. In repairing leadite joints where the entire joint is not removed, lead wool has been used, but owing to the more or less brittle nature of leadite, some superintendents at least have not found this successful, but always prefer to cut out the joint and pour a new one.

Where the pipe is broken, the only permanent and safe remedy appears to be to substitute a sound pipe for the broken one. In some cases, however, where no pipe of that size is at hand or in the case of a large pipe in which a crack has simply opened up without any metal breaking off from the pipe, the pipe has been repaired satisfactorily in the trench. There are two or three methods of making such repairs. One is to place over the crack or broken part a split sleeve, consisting of a sleeve made in two longitudinal halves, which halves are bolted together around the pipe, and lead is poured and caulked into the bell-shaped ends of the sleeve. A method used by George H. Robertson in repairing 12-inch pipe that contained a spiral crack 4-feet long was to place around the pipe five iron bands, each 3 inches by ⅝ of an inch, each band having a flange at each end provided with a bolt hole. These bands were placed at intervals along the crack, the flanges of each located directly over the crack, and drawn up tight by bolts. A strip of rubber was laid over the crack and was driven and held down by strips of wood, wedges being driven between the flanges, under the bolts and on top of the strips. When pressure was put on, this repair did not leak a particle.

CUTTING 12" PIPE IN TRENCH WITH PIPE CUTTER.

Where the broken pipe is to be removed and a new one substituted, the removal of the broken or split pipe may present some difficulties. Either the pipe must be broken in pieces, or several lengths of pipe uncovered and raised by derrick or otherwise until the broken length of pipe can be slipped out of the joint at one end, the lead having first been removed from the joints at both ends. It is generally cheaper, however, to break or cut out one length of pipe and replace it with two short lengths joined with a sleeve, than it is to dig up three or four lengths of pipe in order to remove the broken one and slip in a new length. In taking out the broken length, this can be cut in two by hand, using a chisel, or by means of a cutting machine, of which there are several in the market designed for this purpose. The former generally requires the digging of a good sized hole under the pipe, and is a lengthy and difficult job and the pipe cutter is preferable. If the break or crack has not damaged the pipe except near one end, it is well to cut the pipe in two just beyond the break, so that the unbroken end can be used again. The unbroken part can then be broken out by a sledge hammer, a new piece inserted and the connection with the old pipe be made by means of a sleeve. Where the entire pipe is to be removed, this has sometimes been done by melting out the joints at each end and then exploding a stick of dynamite at the middle of the pipe. The use of the dynamite is especially advantageous when the pipe to be removed is under water or is resting in a rock trench where it would be impracticable to get at the under-side of the pipe to cut it.

In preventing repetitions of leaks or breaks, some of the devices that have been used by various superintendents may be occasionally adopted to advantage. A number of instances of leaks have occurred where the pipe passes under railroad tracks, probably being caused by the vibration of the trains passing above. Some superintendents have found that where there is at least six feet depth of sand or fine gravel above the pipe, the jarring on the pipe is practically eliminated. Therefore, no rocks or similar material should be used in filling a trench under railroad tracks, and if such is present it should be removed and sand be substituted. Another method of reducing jarring is to lay a water main inside a line of larger pipe where it crosses under a track, the outside pipe being either of steel or cast iron. One railroad has adopted the practice, where a main passes under its tracks, of putting a piece of heavy timber (usually an old bridge stringer) on each side of the main, filling and tamping the dirt around these up to the top of the pipe, and placing over it a third stringer; all of the timber extending at least six feet beyond each side of the tracks. In another case, vibration was apparently prevented by driving piles along each side of a main and a foot or two from it, supporting the track on these piles. One superintendent found a leaky joint directly under a rail, but when he changed the pipe so as to bring the joints outside of the track and between the tracks, there appeared to be no further leaking.

Many breaks probably are caused by water hammer occasioned by the too rapid closing of a valve or other rapid stopping of a large discharge. In Wabash a locomotive crane had been placed so as to draw water directly from the main and it was found that when the crane was

(*Continued on page* 111.)

Municipal Journal

Published weekly at
243 West 39th Street
by
Municipal Journal and Engineer, Inc.

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Sec'y

A. PRESCOTT FOLWELL, Editor
SIMON BARR, Assistant Editor
CHARLES CARROLL BROWN, Western Editorial Representative

Telephone, 9591 Bryant, New York
Western Office, Monadnock Block, Chicago

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

FORCE ACCOUNT WORK BY CITIES.

St. Paul has been doing more or less of its paving work by force account for the past six years, and the officials in charge, judging from this experience, believe that it has proved wise to have done so and expect to continue the practice. The reasons are explained on another page in this issue by Oscar Claussen, chief engineer of the Department of Public Works.

Mr. Claussen states, however, that in the opinion of the St. Paul officials, force account work by the city is advisable only when it is possible to make a very close estimate of the cost. But this idea is not held by all city officials, some believing that force account work is desirable also when the risks and uncertainties of cost are unusually great. This belief is founded chiefly on two general principles—that experienced contractors will not undertake such work except at a price that will guarantee them against loss, while by doing the work itself, the city would stand an even chance of saving the amount added by the contractor to protect himself against the risk; and because the city should not, in justice to contractors, ask them to gamble on a contract that might bankrupt them, but should rather assume itself the risks involved in the work.

For work of the latter character there is a middle course—that of employing a contractor to do the work, paying him, for the use of his equipment, his foremen and his own services, a percentage of the cost or a lump sum, or some variation of these. This plan offers the advantage of giving to the city the services of an experienced manager of the work and (what is often more difficult to obtain temporarily) a force of tried foremen and skilled workmen, together with a plant that it might cost the city more to duplicate than it would be wise to spend. Neither the percentage nor the lump sum plan offers the contractor any inducement to keep the cost down, the former, in fact, making it to his advantage to boost the cost as much as possible. Some contractors have met this difficulty by establishing a record for doing work at reasonable cost on the percentage basis, cities relying upon his desire to maintain this reputation as an inducement for being entrusted with future work. There is an increasing number of contractors who are proving their honesty and ability to perform work satisfactorily on the percentage basis, and where such are available there is much to be said in favor of this system.

A serious hindrance to success in force account work by city engineers is the fact that contracting requires a skill and ability that is not necessarily found in an engineer, no matter how good he may be as such. Unless the engineer has such ability, it will generally be more satisfactory to entrust the work to a reliable contractor under some of the plans suggested.

RAISING GAS RATES PAINLESSLY.

The Fuel Administration has announced that it proposes to issue an order making a universal British thermal unit standard of 528 in the manufacture of gas throughout the country. This is the standard now in effect in Massachusetts—but in the other states, standards vary from 550 to 650 B. t. u. The order will mean that from a given volume of gas consumed less heat will be obtained, or in order to cook an equal amount, more gas will be needed under the new standard. The effect of the order is therefore to raise gas prices by from five to twenty per cent if the present rates continue.

At a conference in Washing held by Mark L. Requa, director of the oil division of the Fuel Administration, representatives of a number of state public utilities commissions, of the War Department, the Council of National Defense and the war service committees of the gas-making industry, the question came up as to the price at which gas was to be furnished under the new standard. Mr. Requa said that "the public utilities commissions of the various states should settle that matter for themselves—that the Fuel Administration's principal interest was in reducing oil requirements to a minimum."

The purpose of the order is to reduce the consumption of oil and to enable the gas companies to increase their production of toluol, an important war chemical, and these objects are the principal interest of the cities and the citizens just as they are of the Fuel Administration. But the cities have also a secondary interest—that of keeping rates for public utilities at a fair level and of resisting any attempt, frank or crudely concealed, on the part of the companies to charge unfair rates. Some companies need higher rates in order to get a fair return under present abnormal conditions—and these have not been bashful in asking for them. The others are taking advantage of the nation's need; the war requirements of the government necessitate lower gas standards, but not that the people should pay more. The new standard lowers cost of production. The companies are not making the government a present of the toluol, either—any more than any other war contractors. Leaving price regulation to the commissions will simply mean higher rates until the cities bring a test case backed up by a big united protest before each commission.

It would have been just as easy for Mr. Requa, using the very broad and ample powers of the Administration, to have said that the order would provide for proportionate reductions in prices so as to retain present rates. Why did he not say this? Because there was no one to ask that he do so—in fact, there were men there, representing the gas industry, whose interest it was decidedly not to ask him to make such provision. Only the consumers and the city officials who act for them could have requested such a ruling—but they had not been invited to the conference. It was impossible to receive representatives of each city—and there is nobody to represent all of them.

There is still time to take action for representation for the purpose of urging a fair order. If this opportunity is ignored, the cities must prepare to fight before the commissions—and the sooner they prepare the better.

CAST IRON BELL AND SPIGOT PIPE, A. G. I. STANDARD, 12 FT. LENGTHS

Laying Pipe

Size of pipe.	Number of men: Foreman.	Number of men: Pipemen.	Weight of pipe per ft. in lbs.	Feet of pipe per man-hour.	Feet of pipe laid per hour.	Unit cost per foot at .01 per man-hr.
4	1	2	19.33	21.98	65.09	.000455
6	1	2	30.25	14.05	42.15	.000711
8	1	4	42.08	10.09	50.45	.000991
10	1	4	55.91	7.60	38.00	.001316
12	1	6	73.83	5.75	40.25	.001739
16	1	6	112.58	3.77	26.39	.002652
20	1	6	153.83	2.76	19.32	.003623
24	1	8	206.41	2.06	18.54	.004854
30	1	8	284.00	1.49	13.41	.006711

NOTE.—To find local costs per foot multiply unit cost per foot from table by the local wage scale per hour for pipemen. For water pipe, substitute weights of pipe for those given in the fourth column, and change the following columns proportionately.

Jointing Pipe

Size of pipe.	Number of men: Calkers.	Yarners.	Leadmen	Weight of lead in lbs. per joint.	Weight of lead in lbs. per foot.	Weight of yarn in lbs. per Joint.	Weight of yarn in lbs. per ft.	Joints per hr. for gang.	Ft. pipe jointed per hr.	Unit cost per ft. at .01 per man-hr.
4	1	1	1	6	.50	.37	.0308	6.25	74.00	.000405
6	1	1	1	9	.75	.47	.0391	4.16	49.92	.000601
8	1	1	1	12	1.00	.56	.0466	3.12	37.44	.000801
10	1	1	1	16	1.33	.65	.0541	2.34	28.08	.001068
12	1	1	1	22	1.83	.75	.0625	1.70	20.40	.001470
16	1	1	1	36	3.00	1.06	.0883	1.03	12.36	.002427
20	2	2	1	50	4.16	1.34	.1116	1.25	15.00	.003333
24	2	2	1	62	5.16	1.60	.1333	1.04	12.48	.004006
30	2	2	1	75	6.25	2.00	.1666	.83	9.96	.005020

NOTE.—To find local cost per foot multiply unit cost per foot from table by the local wage scale per hour for calkers.

Trenching and Backfilling

Size of pipe.	Width of Trench—in.	Cu ft per ft.: Trench.	Cu ft per ft.: Bellholes.	Cost of trenching and back filling at .01 per man hr.: Unit cost: Trench.	Unit cost: Bellholes.
4	20	1.66	.405	.00184	.00045
6	22	1.83	.459	.00203	.00051
8	24	2.00	.513	.00222	.00057
10	26	2.16	.540	.00239	.00060
12	30	2.50	.594	.00277	.00066
16	36	3.00	.702	.00333	.00078
20	40	3.33	.783	.00369	.00087
24	44	3.66	.864	.00406	.00096
30	50	4.16	1.000	.00461	.00111

NOTE.—To find local cost per foot multiply unit cost per foot for trench from table by the depth of the trench in feet; then add the unit cost for bellholes from table and multiply by the local labor wage scale per hour. Formula:

[(Unit cost trench) (depth of trench in feet) + (unit cost bellhole)] × (Hourly wage scale in cents).

Summary of Unit Costs

Size of pipe. Inchs.	Labor: Trenching and backfilling: Trench. A	Bellholes. B	Laying. C	Jointing D	Materials: Pipe. E	Lead. F	Yarn. G	Drayage. H
4	.00184	.00045	.000455	.000405	.00966	.0050	.000308	.00966
6	.00203	.00051	.000711	.000601	.01512	.0075	.000391	.01512
8	.00222	.00057	.000991	.000801	.02104	.0100	.000466	.02104
10	.00239	.00060	.001316	.001068	.02796	.0133	.000541	.02796
12	.00277	.00066	.001739	.001470	.03691	.0183	.000625	.03691
16	.00333	.00078	.002652	.002427	.05630	.0300	.000883	.05630
20	.00369	.00087	.003623	.003333	.07777	.0416	.001116	.07777
24	.00406	.00096	.004845	.004006	.10320	.0516	.001333	.10320
30	.00461	.00111	.006711	.005020	.14204	.0625	.001666	.14204

STANDARD SCREW STEEL PIPE

Laying Pipe

Size of pipe. Inches.	Number of men: Foreman.	Number of men: Pipemen.	Weight of pipe per ft. in lbs.	Weight of pipe per man-hr.	Feet of pipe per man-hour.	Feet of pipe laid per hour by gang.	Unit cost per ft. at .01 per man-hr.
1¼	1	2	2.28	237.5	104.2	312.5	.000096
1½	1	2	2.73	236.4	86.6	260.0	.000116
2	1	2	3.36	238.2	65.0	195.0	.000154
3	1	2	7.62	278.9	36.6	110.0	.000273
4	1	2	10.89	289.6	26.6	80.0	.000376
6	1	2	19.19	303.2	15.8	47.5	.000633
8	1	4	28.81	302.5	10.5	52.5	.000952

NOTE.—Laying pipe covers reversing of couplings and handling of the pipe from the curb line to the trench and lowering into same. The weight of pipe per man-hour is not constant due to the reversing of a variable number of couplings per unit weight of different size pipes. To find local cost per foot multiply unit cost by local pipemen hourly wage.

Trenching and Backfilling

Size of pipe—in.	Width of Trench—in.	Cu. ft. per foot of Trench.	at .01 per man-hour: Cost of excavating and backfilling: Per cu. ft. of Excavation.	Unit cost per foot Depth.
1¼	18	1.50	.00111	.00166
1½	18	1.50	.00111	.00166
2	18	1.50	.00111	.00166
3	18	1.50	.00111	.00166
4	20	1.66	.00111	.00184
6	22	1 83	.00111	.00203
8	24	2.00	.00111	.00222

To find local cost per foot for trenching and backfilling, multiply unit cost per foot by local wage per man-hour.

Jointing

Size of pipe.	Number of men.	Joints per hr. per gang.	Ft of pipe per hr. per gang.	Unit cost per ft. at .01 per man-hour.
1¼	2	9	180	.000111
1¼	2	8	160	.000125
2	2	6	120	.000166
3	2	4	80	.000250
4	2	3	60	.000333
6	2	2	40	.000500
8	3	2	40	.000750

NOTE.—Jointing pipe covers the work of entering and screwing up pipe in the trench. The number of joints per man-hour varies as the diameter of the pipe. To find local cost per foot, multiply cost per foot by local wage scale per hour.

SUMMARY OF UNIT COSTS

Size of pipe. Inches.	Labor: Trenching and backfilling. A	Laying. B	Jointing. C	Material: Pipe. D	Drayage. E
1¼	.00166	.000096	.000111	.01	.00114
1½	.00166	.000116	.000125	.01	.00136
2	.00166	.000154	.000166	.01	.00184
3	.00166	.000273	.000250	.01	.00381
4	.00184	.000376	.000333	.01	.00544
6	.00203	.000633	.000500	.01	.00959
8	.00222	.000952	.000750	.01	.01440

Column A.—Cost per foot for trenching and backfilling a trench 1 ft. deep at a labor cost of .01 per hour. For local costs per foot multiply by depth of trench in feet and by labor wage rate per hour.

Column B.—Cost per foot for laying pipe at a .01 per hour wage scale. For local costs per foot multiply by local wage rate in cents per hour.

Column C.—Cost per foot for joining pipe at a .01 per hour wage scale. For local cost per foot multiply by local wage scale in cents per hour.

Column D.—Cost per foot of pipe at .01. Substitute local cost per foot.

Column E.—Drayage cost per foot at $1 per ton-mile. For local cost per foot multiply by the local drayage rate per ton-mile.

Storage and handling cost assumed to be 4 per cent of material cost, regardless of locality. Supervision, engineering, contingencies, assumed to be 10 per cent of total cost regardless of locality.

in use the pressure fell from 50 pounds to 30 pounds, while when the crane was shut off it ran up to 200 pounds. By putting a 2-inch relief valve on the crane connection, the water hammer was reduced to 165 pounds. Probably a better plan would be to put on a pressure reducer or require the connection to be of 2-inch pipe or smaller, so that water could not be drawn by the locomotive so rapidly. Undoubtedly the best plan, and one which the railroads should be required to adopt, if possible, is to fill locomotives from a tank, which tank is filled by more or less continuous flow through a small pipe, regulated by a ball cock. Where there is a quick-acting valve or fixture of any kind two inches or larger, a relief valve should be placed between the fixture and the main to prevent water hammer.

In connection with breaks in mains, considerable damage is done to private property and occasionally to citizens in the street when the break occurs. The courts have held that the city is not liable for such damages, unless it can be shown that the break was due to negligence on the part of city officials.

In making repairs of any kind where there are not more than four or five joints to make, J. M. Diven says that he never takes the trouble to melt up lead for this purpose, but uses lead wool instead. Although it takes a little longer to caulk up a lead wool joint than a poured lead one, this is more than balanced by the saving in not having to bring the lead kettle onto the job.

Leaks are often found in valves rather than in the mains themselves; most commonly, probably, around the stem of the valve. This can generally be remedied by repacking. Some superintendents have used lead wool for this purpose without any other material, while others have combined graphite or graphite and oil with the lead wool. Others use hemp mixed with graphite and oil. One superintendent reported that he always used high grade Italian hemp packing laid in tallow and found this in good condition after twenty-five years of service.

The writer's experience leads him to believe that there are a great many more leaking valves in many cities than the superintendents suspect, and recommends that in every city each valve be inspected at least once a year and preferably oftener. This inspection is not a difficult matter if the location of the valve is known. Unless there is dirt in the valve box, simply removing the cover of the box and throwing the light of a pocket torch onto the valve stem and bonnet are sufficient to show whether the valve is leaking at these points. This periodical inspection has the additional advantage of keeping the superintendent and his employees familiar with the location of all the valves, which familiarity may prove valuable in an emergency.

EXPLANATION OF SUMMARY TABLE, CAST IRON BELL AND SPIGOT PIPE.

Column A—Cost per foot for trenching and backfilling a trench 1 ft. deep at a laborcost of .01 per hour. For local costs per foot, multiply by depth of trench in feet and by labor wage scale per hour.

Column B—Cost per foot for trenching and backfilling a trench 1 ft. deep at a labor cost of .01 per hour. For local costs per foot, multiply by local wage scale per hour. The sum of the local costs of columns A and B equals the total cost of trenching and backfilling, of which two-thirds may be charged to trenching and one-third to backfilling.

Column C—Cost per foot for laying pipe at a .01 per hour wage scale. For local cost per foot, multiply by local wage scale per hour for pipe layers.

Column D—Cost per foot for jointing pipe at a .01 per hour wage scale. For local cost per foot, multiply by local wage scale per hour for calkers.

Column E—Cost per foot of pipe at $1 per ton f. o. b. local city. For local cost per foot multiply by local cost per ton.

Column F—Cost per foot for lead at .01 per pound. For local cost per foot multiply by local cost per pound of lead.

Column G—Cost per foot for yarn at .01 per pound. For local cost cost per foot multiply by local cost per pound of yarn.

Column H—Drayage cost per foot at a rate of $1 per ton mile. For local cost per foot multiply by local drayage rate per ton-mile.

Storage and handling cost assumed to be 4 per cent of total material cost regardless of locality. Supervision, engineering and contingencies assumed to be 10 per cent of total cost regardless of locality.

COST OF LAYING IRON PIPE

Unit Figures for Estimating Cost Under Various Conditions as to Size, Depth of Trench and Costs of Material and Labor.

The superintendent of the gas department of the Denver Gas and Electric Light Company, Geo. Wehrle, has worked out a system of unit figures for estimating the cost of laying gas pipe that are intended to be applicable to all ordinary conditions, and presumably would apply to cast iron water pipe as well as gas pipe. These unit figures were given and their use explained by Mr. Wehrle in an article in *Gas Age*; which article, slightly abreviated, is given below.

The writer enlisted the aid of an appraisal engineer in developing his plan, and they concluded that the first and salient factor must be the man power expended in each class of work, from which can be worked out a unit cost for such class. Experience and theory were called upon for the amount of work a man would do under average conditions in a given time, which would be known as the "man power" for the class of work under discussion. This factor established, the cost of accomplishing that unit of work at a unit time-cost was computed.

Trenching and Back Filling.—It was decided that under average conditions a man would trench and backfill 9 cu. ft. of trench per hour, and that the cost of trenching would equal twice the cost of back filling. The labor cost per hour was fixed at one cent, which gave a unit cost per cubic foot of 0.00111. A table was then worked out showing the cubical contents of one lineal foot of trench of the standard width for each size of pipe and a depth of one foot. Multiplying the cubical contents of a trench by 0.00111 gave the unit cost per lineal foot of trench exclusive of bell holes. As the cubical contents of bell holes would be constant for a given size of pipe regardless of the depth of trench, it is necessary to handle them separately.

The cubical contents of a bell hole was considered to be that contained within a space of 8 in. wide and 18 in. long extending from a point 8 in. above the pipe to a point 8 in. deeper than the bottom of the trench on each side of the pipe and across the bottom of the trench under the pipe. Reducing this to a formula the cubical contents of a bell hole for a given size of pipe equals: $2 \times 8 \times 18 \times$ (diam. of pipe $+ 16) + 8 \times 18 \times$ (width of trench).

Dividing this result by 12, which was considered to be the length of a joint of cast iron pipe in feet, gives the cubical contents of a bell hole per lineal foot of trench. Multiplying this figure by 0.00111 gives the unit cost of bell holes per lineal foot.

The cost of trenching and back filing for a given size of pipe in any locality can be found by the use of this simple formula:

Cost of trenching and back filling = $(A \times B + C)$ D.

A = The unit cost for trenching from table.

B = The depth of trench in feet.

C = The unit cost for bell holes from table.

D = The labor cost in cents per hour.

The variable factors are hereby reduced to two and the calculation becomes very simple.

No attempt has been made to separate the kinds of soil encountered, which might be hard, medium or easy, and the manpower is considered to be that expended in medium soil which will meet average conditions. It is believed that conditions of hard and easy soils will in most cases balance each other, but under extreme

circumstances, where the kind of soil to be encountered is known and is generally of the same character, allowance can be made by establishing a ratio between known and average conditions and using it as a multiplier of the resultant obtained by using the above formula. In this way a unit figure may be obtained which will exactly meet local conditions if such accuracy is deemed necessary, but for practical use we believe the use of the formula will serve all except very remote purposes.

In finding trenching costs for screwed steel pipe the same unit cost is used as for a given sixe of cast iron with the omission of the bell hole.

Pavement and crib timbering costs have not been considered as they are of a very variable character and best handled individually.

Laying Pipe.—The labor of installing pipe, which in the case of cast iron covers the handling of pipe from the curb line to the trench, swabbing out, inspection and lowering into trench, and for steel pipe the work of reversing couplings, handling from curb line to trench, swabbing out, inspection and lowering into trench, was worked out by establishing an amount of pipe in lineal feet that could be handled in a given time by a standard pipe gang composed of a straw boss and a certain number of men for each size of pipe, based upon the weight of a foot of pipe of a given size and the size of gang required to handle a standard length of the pipe.

In arriving at the number of men required to handle the pipe it was considered that all pipe under 12 in. in diameter would be lowered into the trench by means of ropes held by the men while 12 in. and larger would be let into the trench by means of a portable derrick.

A ratio of weight per man-hour was established which in the case of cast iron pipe was found to be approximately 425 pounds of any size of pipe. The number of men in the gang multiplied by this constant and divided by the weight of a foot of pipe of a given size gave the number of feet of that size pipe which could be laid by the gang in one hour. The unit cost per foot for each size of pipe was found by using a labor rate of .01 per hour multiplied by the number of men in the gang and divided by the feet of pipe the gang could lay per hour.

As but one variable enters into the calculation for finding the cost of laying pipe in any locality, that of labor cost, it is only necessary to multiply the unit figure found in column B of the chart for steel pipe or column C of the chart for cast iron, opposite the size of pipe to be laid, by the local labor rate in cents per hour.

It is the usual practice in laying pipes of the larger sizes to have a pipe gang foreman who is paid a little more than the common pipeman, but this difference in wage is inconsequent when compared with the total for the gang and has therefore not been considered, the common wage scale being used as a multiplier and the foreman counted as one of the men composing the gang.

Jointing.—The unit cost per foot for jointing cast iron pipe was calculated in the same manner as for laying except that the weight of lead per joint instead of the weight of pipe per foot was used as a base. The number of men comprising the jointing gang was first decided and then the number of joints that they could make in a given time was calculated by establishing a ratio between the weight of lead and a man-hour. It was found that this ratio was 12.5 and the unit cost worked out at a .01 per hour wage scale by multiplying the number of men in the gang for a given size of pipe by the constant 12.5 and dividing by the weight of lead required to joint that size of pipe. This figure multiplied by 12 gave the feet of pipe jointed per hour. Multiplying the number of men by .01 and dividing by the feet of pipe jointed per hour gave the unit cost per foot for jointing.

The cost of jointing having but one variable for any locality, that of wage, to find local cost per foot, it is only necessary to multiply the unit figure found in column C for cast iron pipe and column D for steel pipe, opposite the size of pipe to be laid, by the local wage scale for calkers or joiners in cents per hour. As three kinds of labor are usually employed in jointing pipe, calkers, yarners and leadmen, each of which may receive a slightly different wage, the wage of the calkers only were used in calculating the unit figures shown in chart, the discrepancy by this method being practically negligible for estimating purposes.

In jointing steel pipe the number of joints per man-hour is considered to vary as the diameter of the pipe which takes into consideration the friction to be overcome in jointing pipes of different sizes as well as the weight of the pipe per foot of length.

Cost of Materials.—The cost of pipe per foot used in charts is figured at $1 per ton for cast iron and $0.01 per foot for steel pipe, making it a simple problem to obtain local costs by multiplying by local prices.

Lead and yarn are figured at $0.01 per pound each.

Fittings and specials are not included in charted costs, as conditions often make it necessary to handle this matter individually. For general estimating where extreme accuracy is not important, the unit cost per foot of pipe may be considered as including specials.

Store expense, which should cover the cost of maintaining a pipe storage yard or warehouse, unloading from cars, checking material, etc., has been estimated at 4 per cent of the total cost of materials. This figure was obtained by checking the cost in several cities, and while it may not hold absolutely true in these days of abnormal prices, will not prove an error of great consequence where it is considered that at this time storage labor cost also has advanced above normal.

Drayage covers the cost of transporting materials from storage yard, warehouse or cars to the job and is based upon a cost of $1 per ton mile. Local drayage costs are obtained by multiplying the unit costs found in the tables under column E for steel pipe and column H for cast iron pipe and opposite the size of pipe to be handled by the local cost per ton-mile in dollars.

Supervision, engineering and contingencies, which includes the time of the general foreman, watchman, waterboy, etc., the cost of preliminary surveys and estimates, running levels, lines, etc., as well as permits and overhead expenses or contingencies not otherwise classified, is estimated as 10 per cent of the total cost of the job.

It is understood that a portion of the cost included in this classification usually is charged to operation, but must be included in valuation work where the entire cost of replacement is considered. Owing to the liability of unforeseen contingencies arising in any construction work it is good policy to use the entire 10 per cent in all estimates as a safety factor.

Appraisal engineers may find use for these charts and data in evaluating distribution systems as present day values may be obtained as readily as actual cost figures by substitution of the prices desired.

It was considered in all calculations that each class of work is carried on continuously, but that this is not a fact in usual practice does not effect the unit costs as units of time, money and man power were used in obtaining the unit costs which makes the cost per foot the same regardless of whether the operations are carried on a fraction of an hour per day or continuously.

The WEEK'S NEWS

Damage by Trucks to Connecticut Highways—Progress of Passaic Valley Sewer—Anti-Fly and Mosquito Campaign of U. S. Public Health Service—Seattle's Appeal to Washington Wins $5,500,000 Hydro-Electric Plant—Disastrous Fires in Peekskill, N. Y.; Newark, N. J.; Stamford, Conn., and Clarksdale, Miss.—Salt Lake City Firemen Call Off Strike—Atlanta District Capital Issues Committee—State Utility Commissions Urge Creation of Federal Utilities Administration.

ROADS AND PAVEMENTS

Federal Approval for Paving Charges Against Railroads.

Washington, D. C.—The United States Railroad Administration has issued a circular which says that "Wherever street or road construction and other public improvements are contemplated by the authorities in any state, county, district, or municipality, for which a portion of the cost in an amount exceeding five hundred dollars ($500) is to be charged against any railroad under Federal control, the authorities are requested to take the matter up with the Federal management of the road directly interested and secure the concurrence of the Railroad Administration in advance. In the event this is not done the Director General will reserve the right to decide whether or not he will participate in the payment. It is not the attitude of the Director General to oppose construction of this character which is meritorious and essential. The Director General feels, however, that in the present stress as to the essential labor and material supply all work of this kind which can be postponed without injury should not be undertaken, and the railroad should not be expected to participate in the payment unless the expenditure is indispensable."

Road Damage by Trucks in Connecticut.

Hartford, Conn.—Charles J. Bennett, state highway commissioner, has issued a warning against the transportation of unreasonable loads over the highways. "While the use of trucks is undoubtedly a patriotic necessity, the action of some of the drivers in carrying an unreasonably heavy load on one truck is decidedly shortsighted patriotism," is his statement. "Vivid examples of the effect of this practice on our roads are seen on the Berlin turnpike between Hartford and Meriden and on the Waterbury-Southington highway. The Hartford-Meriden section, which is most damaged, was built of waterbound macadam, cold-oil treated in 1912, has a 7-inch trap rock surfacing with a clay subgrade. The adequacy of the drainage probably is questionable. In 1915 there was practically no heavy truck traffic over this highway. In the present emergency there are probably 3,000 vehicles per day, of which 200 are five-ton trucks. The Waterbury-Southington highway is an earth road surfaced with three inches of trap rock on a clay base and subgrade. Three-fourths of a mile were badly broken during the spring months. In 1915, the heavy traffic units going over this road did not exceed fifty; now, out of a maximum of 2,500 vehicles, about 250 are of the heavy truck type. The state roads, when originally built, were not built to carry the excessive truck loads which are now passing over them, and the weakness of these roads develop particularly during the bad subsoil conditions when the frost is coming out of the ground. There are two remedies for this ill: First, the restriction of weights of trucks and the stopping of truck traffic when the damage is greatest; and second, the construction of roads sufficiently strong to carry reasonable loads. It is, of course, impractical to prohibit the use of roads by trucks, even for a short time, however great the damage, and it is also manifestly impossible to construct the roads sufficiently strong to carry any load which may be passed over them. Consequently, a compromise must be reached, and this compromise in Connecticut, at least, has taken the following course: Loads on four wheels are restricted to 25,000 pounds, except that in special instances which may be designated by the highway commissioner, heavier loads are allowed. License fees are out of proportion, as truck weights increase, which tends to discourage the purchase of extremely heavy truck units and to provide for the purchase of additional trucks or the use of rubber-tired trailers. The effect of these regulations is to limit the truck capacity to that of a five-ton truck with a reasonable overload. On the other hand, the state highway department has been working along definite lines, looking toward the strengthening of its roads system so that little, if any, damage will be done to the roads, providing the above restrictions are followed. With the above policy it would appear that eventually a compromised solution of the difficulty would be reached. If all restrictions as to weights of vehicles were removed, the result would be the breaking down of many long sections of highway which have not already been strengthened, and result in the entire stagnation of traffic at certain periods in the year, which must not be allowed. Certainly a 5-ton truck with trailers distributing the load over the surface of the road, rather than centering an extremely heavy load on four wheels, would solve the difficulty. An additional problem which will have to be met is damage to bridges, but that is minor compared to the problem of the roads."

SEWERAGE AND SANITATION

Passaic Valley Sewer Hampered by Delinquent Payments.

Newark, N. J.—Unless delinquent municipalities meet overdue payments to the construction fund of the Passaic Valley Sewerage Commission, it will be forced to stop work now under way, according to a statement by the commission's chairman, James P. Logan. Mr. Logan added that a tie-up of the work might result in suits by the contractors against the commission, and the necessity of making new contracts at a big increase in cost. A total of $2,234,969.37 is due to the commission and letters have been sent to the defaulting municipalities impressing upon them the importance of hurrying their payments. Mr. Logan explained that administration officials in some of them are anxious to pay, but that the necessity of obtaining certification of bond issues by the Capital Issues Committee is holding them up. To meet this situation the commission asked the help of the committee. At a special meeting of the committee, the representatives of Newark, Kearny and Rutherford were present and emphasized the need of making their payments. Adrian Riker reviewed the history of the sewer from the time the project was begun. He said that the work had to be done. He explained that $10,000,000 had been actually spent on it, and that the work was about eighty-five per cent. completed. Mr. Logan called attention to the fact that the ship yard of the Submarine Boat Corporation and other ship yards of the Emergency Fleet Corporation were at the mouth of the Passaic River and also that there were a number of factories producing war materials along the water front. The stench arising from the river, he argued, was obnoxious and injurious to the health of the workers in these plants. The committee reserved decision. The payments due follow: Newark, $1,434,707.08; Belleville, $66,355.02; Nutley, $20,723.03; Paterson, $452,624.77; Passaic,

$89,299.09; Clifton, $26,937.97; Garfield, $6,285.83; Wallington, $2,902.75; Rutherford, $2,776.62; East Rutherford, $1,291.41; Lyndhurst, $5,800.65; North Arlington, $715.65; Kearny, $60,165.97; East Newark, $16,063.22; Harrison, $49,020.31. In the case of Belleville $38,960.75 of its total is due on its original contract with the commission, made when it joined in the sewer plan. In his general statement, Mr. Logan said that under present construction contracts, totalling $12,876,887.70, the commission has paid out $9,862,723, and that, if it could collect from the municipalities, it would, with the money in hand, have sufficient to clear the state of all obligations, paving the way for new contracts. "The present contracts were made under most favorable conditions," said Mr. Logan, "and it would be a very serious matter indeed if the commission should be compelled to stop the work. This is the only course it can take under the law, however, unless the municipalities meet their obligations." In its letter to the municipal authorities, the commission calls attention to the situation that would develop should it default in its payments to the contractors. The letter, in part, follows: "The Passaic Valley sewerage commissioners are obligated for the entire sum under existing contracts for construction work. Rapid progress is being made under these contracts and the commissioners must be in a position to make payments as soon as work is performed. The commissioners will be called upon to make large disbursements during the rest of the year. It is essential that your municipality make payment of the moneys due. Without funds the commissioners would be unable to meet their contractual obligations and failure to do so would result in many unfortunate circumstances. The existing contracts are very favorable as to price. The necessity of readvertising this work at a later date would result in much higher prices and the loss to the sewerage district would total hundreds of thousands of dollars. Besides, there would be large claims from present contractors for losses entailed in the cessation or abandonment of the contracts. It is a matter of great importance that payments be made by the municipalities to the commissioners and it is earnestly requested that you arrange to make payment of the money due at an early date. The necessity is urgent."

To Vote Bonds for Health Campaign.

Meridian, Miss.—The city council has passed a charter amendment and ordinance providing for a proposed bond issue of $8,000 for a sanitary survey and health campaign. The question will be placed before the people for decision in an election and if it is passed will be referred to the Governor for the charter amendment to be approved and recorded. When this preliminary action is completed the money will be appropriated and all arrangements made for starting the survey and health campaign.

U. S. Public Health Service Fights Flies and Mosquitoes.

Washington, D. C.—According to a statement from the Surgeon General's office in the War Department, "to guard troops stationed in camps and cantonments from disease carried by mosquitoes and flies, the medical department of the Army has installed a system of prevention which is safeguarding not only the soldiers but also civilians living in the neighborhood of training camps. There is attached to each camp a division surgeon who is responsible for the health of the camp. Assisting him is a sanitary inspector who has the assistance of a sanitary engineer and from 100 to 200 enlisted men who are continually employed in work designed to protect the health of the soldiers. Special attention is now being given in all camps to cleaning up spots where mosquitoes and flies breed. In some cases it has been necessary to dig channels in streams, drain swamps, and put in elaborate ditching systems in order to clean up stagnant pools and streams. In those cases where it has been found impossible or impracticable to drain swamps and to do other work of a similar nature, there has been installed a system for keeping these slow-moving streams and still bodies of water covered with oil. At all points within the camp where there is the slightest possibility of mosquitoes or flies breeding, daily spraying of oil is done. Arrangements have been completed with the Federal Public Health Service to carry out a similar program in the territories adjacent to the camps. The Health Service has agreed to fill bogs, open streams, and drain swamps and continue the oil spraying for a distance of one mile around all camps. Special precautions have been taken to prevent the spread of disease by flies. With the approach of the fly season a general order was sent to all division surgeons and other health officers to take all necessary steps to prevent the breeding of flies. Instructions were given on the disposal of materials that were likely to become breeding spots. Arrangements were made to protect all food from flies. With this end in view all buildings in which food is prepared or stored were screened. The entrance to the buildings have been vestibuled. An added guard is the placing of flytraps in all buildings. An average of 6,000 such traps have been placed in each camp. More than 22,700,000 square feet of screening has been placed in all camps.

WATER SUPPLY

City Gives Neighbor More Water.

Newark, N. J.—To give Jersey City further help to overcome a shortage of water, Newark has agreed to divert 3,500,000 gallons a day to that city. Officials of Jersey City applied to Newark for more water, explaining that it is needed for railroad terminal demands in that city. In March Newark began giving Jersey City 1,500,000 gallons a day to make up a shortage due to the inability of the Jersey City pipe lines to carry the city needs from the Boonton reservoir. This assistance has been kept up almost daily until the present request for an additional 2,000,000 gallons a day. The additional request was granted for a few days only. It would be a good thing for Newark to establish a reciprocal policy between it and Jersey City, said chief engineer Morris R. Sherrerd of Newark, because it is probable that Newark may have to make a similar request for help in a few years. The engineer pointed out that Jersey City could aid easily if it carries out its present plans to build new pipe lines to its water supply at Boonton. The importance of the terminal facilities at Jersey City in the country's war program alone would be justification for Newark answering the present call for help, Mr. Sherrerd pointed out.

Breakdown of Pumps Closes Industries.

Little Rock, Ark.—Almost simultaneous breakdown of three of the five pumps at the Arkansas Water Company's plant resulted in Camp Pike being left with very little water supply. The same condition applied to Little Rock. Two remaining pumps could handle only 8,000,000 gallons per day and the consumption is 20,000,000. Strict conservation measures were put in force. War Department officials were notified of the condition. All industrial plants were shut off.

Commission's Right to Raise Rates Upheld.

Sedalia, Mo.—The state supreme court at Jefferson City has issued an opinion which upholds the power of the public service commission to set aside franchise contracts. The opinion was written by chief justice Graves in a case where the city of Sedalia had appealed from an order of the commission upholding a franchise contract with the Sedalia Water Company. The decision was unanimous. It created interest because of its bearing on six-cent fare and similar utility cases. In discussing the powers of the commission to set aside franchise contracts under the police power of the state, judge Graves wrote: "The sovereign police power of the state is preserved intact, irrespective of contracts with reference to rates for public service. No contract as to rates will stand as against the order of the Public Service Commission for reasonable rates, whether such reasonable rates be lower or higher than the contract rates. Under the Constitution and the

Public Service Commission act, the commission is exercising the police power of the State by its delegated authority from the Legislature. Its rates, therefore, constitutionally and legally supersede any and all contract rates."

STREET LIGHTING AND POWER

May Not Increase Legislature's Gas Price.

Albany, N. Y.—The price of gas in this city will not be increased because the Court of Appeals has sustained the Appellate Division in affirming the determination of the public service commission which denied the petition of the Municipal Gas company to increase the present rate 30 cents a thousand feet. Because this decision definitely denies to the public service commission the power to hear applications of gas companies to increase rates beyond special statutory limitations, it is of state-wide importance. The Bronx Gas and Electric company, which had a similar case pending in the Appellate Division, first department, filed an intervening brief to review the action of the public service commission, first district, in denying its application to increase its rates to more than one dollar. This means that gas in New York will remain at 80 cents. The application of the Municipal Gas company was denied by the commission May 14, after a public hearing at which Arthur L. Andrews, corporation counsel, opposed the increase on the ground that the law of 1907 limited the maximum price of gas to Albany consumers at one dollar. He also held that the company had not made out a case in an effort to show that present rates are inadequate. Attorney for the gas company contended that the commission had the power to grant an increase sufficient to yield a fair income. He claimed that the deficit for the year would be about $100,000 if the increase asked was denied.

Seattle Wins $5,500,000 Improvement After Appeal.

Seattle, Wash.—After being refused approval by the local capital issues committee at San Francisco, the city has won its appeal to the Capital Issues Committee at Washington and will proceed with its plans for selling $5,500,000 bonds for the further development of its hydro-electric projects. Mayor Ole Hanson; C. B. Fitzgerald, chairman of the finance commission; corporation counsel Hugh M. Caldwell and former city engineer R. H. Thomson went to the capital to press their case. President Wilson was appealed to and the papers in the case were transmitted to the Senate. The petitioning committee's plea was based on the results of an investigation made by city engineer Dimmock, superintendent of lighting F. D. Ross and former engineer Thomson. City engineer M. M. O'Shaughnessy of San Francisco was retained as expert to investigate. They found that the construction of a new hydro-electric plant on the Skagit river is urgently necessary at the present time because there is no surplus power available in the district and the city's present hydro-electric plant is in such condition as to be in danger of failure. The demands for power have been greatly increased, war industries having added considerably. The city officials showed that the maximum usable power from hydro-electric sources, including the White River plant, the Snoqualmie plant, the Electron plant and the Cedar Falls plant, is approximately 96,000 hp. and that the maximum usable power from steam which can be produced under present conditions in the Seattle district is approximately 41,000 hp., making a total of available usable energy of 137,000 hp., as against a total maximum demand during 1917 of approximately 128,000 hp., leaving a theoretical surplus of only 9,000 hp. Since this time and up to July 1, 1918, additional demands for power have been made upon the municipal plant and contracts signed for 17,000 hp. and notification has been given to the management that an additional supply of 44,000 hp. will be required in the near future. To furnish this amount of current to customers, it is stated that an additional installation to develop approximately 67,000 hp. will be required, and that if this is not done there will be a power shortage at the end of the year amounting to 58,000 horsepower. The development of an additional hydro-electric plant at this time, the committee said, is not the hastily conceived plan or freakish idea of any one, but is the logical and normal growth of a necessary municipal utility. Economy in the use of light and power has been urged, and the city has darkened many of its street lights in an effort to conserve fuel and the energy developed therewith. Although within the State of Washington there is 9,920,000 potential water horsepower, of which only 3.3 per cent has been developed, practically two-thirds of the power being generated by the city is generated through the use of fuel oil. At the present time about 700 barrels of oil per day are being used by the city for this purpose, at a daily cost of $1,190. As winter approaches this will increase to 1,000 barrels a day, causing a daily expenditure of $1,700, or an average yearly expenditure for oil of more than $500,000.

It is pointed out that the city could burn other fuel—coal by means of stokers or in powdered form, or mill refuse. Coal in Seattle averages about 10,000 B.t.u. per pound, so that even if burned at the same efficiency as oil, it would require as the equivalent of 1,000 barrels over 300 tons of coal daily. Stokers would require special coals, and the capacity of the boilers would probably be limited. Powdered-coal equipment would cost, with railway and land for storage, about $350,000. The time required to get this equipment, and to obtain the necessary lands by condemnation, would be nearly as long as it would take to build a 35,000-kw. hydro plant on Skagit River. As to the men used, counting miners, railway men, coal handlers and firemen, there would be about the same number of men employed on a coal-burning steam plant as in the building of a hydroelectric plant. Summarizing, the committee urges that it is imperative that the city proceed at this time with the development of additional hydroelectric power, for the following reasons:

1. There is at this time no surplus of power (regardless of how generated) in the city of Seattle or deliverable thereat.
2. Assuming for the purpose of argument that a surplus of power exists at this time, there are two answers: (a) that it is generated by the use of fuel, while water power goes to waste, and by operating at all times steam auxiliary plants that were only intended as standby or emergency plants, leaving no reserve in case of accidents or disasters such as have heretofore actually occurred; (b) any apparent surplus will be wholly inadequate to care for the peak load of the coming winter, and no provision is being made for the peak load of a year from the approaching winter.
3. The actual condition of the city's existing hydroelectric plant, relying as it does upon the old wooden dam and penstocks and the wooden building, will stamp any course as criminal neglect which does not without delay make immediate provision for its relief at the earliest possible date. Obviously, a relief plant must be started or no relief can be had.
4. The city obtains its entire water supply for all purposes from Cedar Lake. The daily supply is 62,000,000 gal. Should the old wooden power dam go out, Cedar Lake would be lowered 14 ft., the result being that the city water supply would be entirely dependent upon the low water flow of the river, which at times has been about 32,000,000 gal. (approximately one-half of the present water supply).

FIRE AND POLICE

Five Firemen Killed in Grain Warehouse.

Peekskill, N. Y.—Seven men lost their lives and many others were seriously injured in a fire which destroyed a large grain warehouse in early morning. Six of the dead and four of those injured were members of the Peekskill volunteer fire department. The property loss is estimated at $350,000. The heavy loss of life was due to the collapse of one of the brick walls of the warehouse at a time when the firemen had just placed their ladders against it and several had begun to mount. The wall, which was two feet thick and more than thirty feet in height, fell outward and every one near it, as well as the men on the ladders, was buried in the debris. Fire department surgeon Dr. C. R. F. Greene was killed. The fire was first discovered shortly before midnight, and by the time the firemen arrived they found the entire structure, which was about 200 feet long and 100 feet wide, in a blaze and the flames, having already broken through the roof, leaping a hundred feet in the air. The fight with the flames had gone on for more than two hours, and it was plain that the building and all the seventy carloads of grain within it were doomed when the firemen set their ladders against the blank wall

on the windward side, intending to carry hose up and play directly down into the interior. One man was already near the top when it was noticed that the wall was beginning to bulge slowly outward. Several warning shouts came too late, and a large section of the wall near the top, directly above him, fell knocking him off the ladder and burying him beneath a pile of bricks at its foot. The other men, heedless of the danger, had run forward to try to save him, and just as they reached the foot of the ladders the entire wall came down with a roar and a crash, burying them under a mound of debris. Though the rescue parties dug frantically into the mass, so deeply were the men buried that it was nearly four hours before the first bodies were recovered, by which time the fire had burned itself out.

Four Firemen Hurt at Factory Blaze.

Newark, N. J.—Four firemen were hurt at a two-alarm fire in a wagon manufacturing plant, but not one of the men was injured seriously. Firemen Arthur Erd and Louis Gommoll were thrown into the Morris Canal when a section of the wall on the north side of the building collapsed. Two others were struck by falling debris. The origin of the fire is unknown. The damage is estimated at $40,000 The four firemen were working on the Canal street side of the building, where the fire made its greatest headway. The flames ate through the wall until the brick and mortar crumbled, carrying two firemen with it into the canal. A short distance from the spot where the wall fell stood patrolman Herman Hagemiller. Although fully clad in uniform, including raincoat, boots and helmet, he plunged into the water after the two firemen. He handed the wounded firemen up to their companions waiting on the canal bank. The same crash brought a mass of debris down upon the other two firemen. The fire broke out early in the morning in the two-story building which adjoins the main four-story brick plant. Paints and oils and other highly inflammable material were stored in the smaller building and in a few minutes the interior was a mass of flames. The main building caught fire before the firemen arrived. As soon as the firemen saw the nature of the burning material a second alarm was turned in. It was feared that the fire might spread to nearby buildings. Water in such volume was poured into the main building that the firemen succeeded in confining the blaze to the first floor. This floor and all of the smaller buildings were wrecked. The other floors of the main building were damaged considerably by smoke and water. Automobiles and wagons were burned. Included in the loss at the fire was a new motor truck just completed for the salvage corps. The truck was to have been delivered within a few days and was held at the factory while the paint was drying. All that is left of it is a charred mass of metal. Although members of the salvage corps at work there saw their new truck in the flames, they were unable to save it.

Soldiers in Gas Masks Help Fight Fire.

Stamford, Conn.—A score or more firemen and U. S. soldiers were overcome by fumes while fighting a stubborn slow-burning cellar fire in a grocery store, which took three and a half hours to get under control. The cause of the fire is not known, and the damage, chiefly the firm's stock, and to the building is estimated at $25,000. During the course of the fire, chief Harry W. Parker and lieutenant Edward Wilson had a personal encounter because of Wilson's alleged failure to do something when directed by his chief. Blows were exchanged and Wilson was ordered off duty and suspended for 48 hours, pending hearing. Ten lines of hose were used to combat the fire. Because of the type of structure of the building and some of those near it, and because of the rapidity with which firemen were overcome by smoke, hurry calls were sent to Sound Beach, Springdale and Glenbrook departments. All responded quickly. The Glenbrook company was held in reserve, and the others got into the fire-fight quickly and rendered valuable assistance. Members of both these companies were among the firemen overcome. Very efficient aid was rendered by the United States soldiers who work in the Edgewood Arsenal here. One of them served for two years in the Erie (Pa.) fire department before he was drafted. His service was especially effective. About ten soldiers were overcome, but only a few were sent to the hospital. These soldiers were among the first to reach the place and they quickly volunteered to help the firemen. Lieutenant Jones, in charge of the soldiers, despatched an automobile to the arsenal for an improved type of the mask, and masks enough were brought to equip all the fire fighters. The masks used by the firemen at first were not so good. They slipped out of place frequently, and, when they became wet, were of little value.

Strike of All Firemen Averted by Mediation.

Salt Lake City, Utah.—The threatened strike of the city's fire fighters has been called off. Through the state industrial commission the eighty-three men constituting the department forces of the city, reached an agreement with the city commissioners whereby all differences have been settled and the men have withdrawn their resignations. The men held out until the conference for a $20 a month increase in pay all along the line and twelve hours additional time off each seven days. At the conference it was demonstrated that in order to grant the twelve hours additional time off each week it would be necessary to underman the apparatus or engage more men. The commissioners were unwilling to engage more men at present and could not consent to undermanning equipment. The commissioners were willing to grant an additional $15 a month to the men, and at the conference the men decided to accept the offered increase. This gives the third class men $100 a month, the second class men $110 and the first class men 120. Lieutenants will receive $125, captains $145 and the assistant chief $165. The matter of the twelve hours additional time was settled by a re-adjustment of meal hours. Schedules have not yet been entirely worked out, but it is expected the men will now have three periods off during each week, divided into one period of twenty-four hours, two of twelve hours each, the periods of leave to be uninterrupted. There was some discussion as to the use of men from Fort Douglas in the department without the declaration of martial law, and it was doubted if this could be done under the circumstances, as the firemen had signified their willingness to assist in case of a severe fire. The commission for the first time recognized the firemen's union, Salt Lake local No. 81, International Association of Fire Fighters.

Fire Destroys Sixty Buildings.

Clarksdale, Miss.—Fire originating in a building in the rear of a grocery company, swept a large portion of the city, entailing a total loss approximated at $200,000. The heaviest individual loss was sustained by a lumber company. Approximately sixty buildings were burned, not including the lumber plant. These included residences and stores. The entire burned area was a mass of frame buildings and the delay in turning in the alarm after the fire started gave the flames good headway before the fire company could get on the scene. The flames spread rapidly in spite of what the firemen could do, owing chiefly to the fact that there was no water pressure and a high southwest wind was blowing, while the frame buildings, dry from the protracted drought, were chaff before the blaze. Suddenly the wind shifted in almost the opposite direction and whipping across an alley, the fire quickly spread to the buildings to the south of the place of origin. It seemed for a while that the entire section would go up in smoke and flames, but the wind died down, enabling fighters to prevent the blaze spreading across the street. Efforts were made to obtain dynamite to help stay the advance of the flames, but there was none to be had. The negroes who had been made homeless by the fire were scattered all over that section of town. Mayor McNair and others spent a greater portion of the night in giving what aid they could to these people, and in addition the mayor appointed a relief committee to look after the wants of the sufferers and prevent suffering. A statement from the mayor said: "The administration has expended large sums of money on fire apparatus, in fact so much money that it has at times been criticised for its acts. Nevertheless be-

lieving that they knew better than the thoughtless critic the administration has just dug an artesian well, furnishing a thousand gallons a minute to the city in addition to the other water supply. Although often requested to give us a priority order for a motor for the pump on the new well the government has for the past thirty days delayed this, and consequently there was great fear that the water supply would give out yesterday. However, the fire was confined before the supply entirely gave out."

GOVERNMENT AND FINANCE

New Capital Issues Committee.

Atlanta, Ga.—Permanent organization of district committees on capital issues in the sixth federal reserve district has been announced by Charles S. Hamlin, chairman. In making the announcement, Mr. Hamlin said the appointments were made with a view to obtaining the widest possible representation, both geographically and with respect to the many interests concerned. This organization replaces the temporary committees which have served since February. The permanent organization follows: M. B. Wellborn, chairman, Federal Reserve Bank, Atlanta; Joseph A. McCord, vice-chairman, Atlanta; V. H. Kettig, Birmingham; J. K. Ottley, Hollins N. Randolph, Atlanta; James E. Zunts, New Orleans; A. M.. Baldwin, Montgomery; James E. Caldwell, Nashville; F. E. Gunter, Jackson, Miss.; Harry Hull, Mobile; S. H. Hessinger, Otto Marx, Birmingham; Edward W. Lane, Jacksonville; W. F. McCanley, Savannah; L. M. Pool, New Orleans; T. R. Preston, Chattanooga, and T. C. Taliaferro, Tampa, Fla.

Higher Pay for State Employes.

Albany, N. Y.—State Controller Travis has announced that effective as of July 1, approximately 15,000 out of 21,000 civil service employes in the 170 state departments, bureaus, and institutions became entitled to an increase in pay of 10 per cent. for the duration of the war. The first payment was made on July 15, and for this purpose a special appropriation of $1,000,000 was made available. The law affects only those employes having an annual salary of less than $1,500 for whom no special compensation had been made exceeding the 10 per cent. increase. All civilian employes called into the Federal service are entitled to it, as well as armory employes, persons employed by the judicial districts, and special banking or insurance examiners. Those employed for only brief periods as well as those who receive only part of their compensation from the state, are not entitled to the benefits. This excludes employes of the courts and of the county offices.

No Contract by Retiring Officials, Says Court.

Wilkes-Barre, Pa.—Holding that it cannot agree with the appellee that the construction of a public road is a business as distinguished from a governmental funtion of the county, the supreme court in a decision handed down and written by justice Simpson, reverses the judgment of the county court in the suit of C. H. Moore against the County of Luzerne in which the plaintiff asked for a six per cent commission on the Hazleton County road which was built at an expense of $129,226.31. A jury returned a verdict in favor of the plaintiff for this amount. County commissioner John J. Moore, John Todd Walsh and W. C. Brenton, refused to recognize a contract entered into with Moore by their predecessors a few days before going out of office, in which Moore was to be the engineer for the new county highway which would be built during the administration of their successors. The county commissioners just taking office held that they were not bound by the action of their predecessors. The court says:

> The court cannot blind its eyes to the fact that in public and private life alike, an official or agent whose term of service is about to expire, might be tempted to favor his friends and retainers at the expense of his principal. Because thereof, public policy requires that the courts, in furtherance of public and private honesty and fair dealing, shall apply such procedural rules as will prevent or limit what possibly may result from yielding to such temptation.

The opinion among other things also says:

> "We are of the opinion that the judgment below is erroneous. The contract was made by the county commissioners but a few days preceding their retirement from office, and the induction of their successors, and related to work, all of which was to be performed after they had ceased to be public officials. As the record now is, it is barren of any explanation of that material fact. It is a mistake to suppose that because a public official, or indeed any other agent of a known limited term has power to make a contract, that he is authorized thereby to make one for an indefinite or long extended term. If the agency itself does not expressly limit the extent of the agent's power, then the facts and circumstances of each case must be considered in determining it.
>
> "Ordinarily it is limited in time to the term of the agent who makes it. Necessity or its equivalent of great advantage to the principal, may furnish a reason for enlargement beyond the term, but he who asserts the existence of the necessity or great benefit has the burden of proving it. This is particularly true of public officials, else those going out of office might so tie the hands of those coming in as to cause serious embarrassment, and loss to the public. Every one would concede, for instance, that an outgoing board of county commissioners might well contract for the coal needed in the county offices during the existing or ensuing winter, although their terms ceased on the first of January; and every one would likewise concede that their contract for coal to cover a decade would ordinarily be wholly beyond their power."

City Employes Walk Out.

Springfield, Mass.—For the first time in Springfield's history skilled city employes have struck for more wages. The long-drawn-out wage controversy between the engineers employed at the municipal and almshouse heating plants and the city government was brought to a climax, when the employes of the municipal heating plant walked out on strike to enforce their demands for the union scale of $28 a week for third-class engineers. The municipal heating plant was closed down, shutting off all elevator service and the hot water supplies in the municipal buildings, and the fire and police department buildings. The increases sought by the men would mean an appropriation of $485 for the rest of the year. The demands of the engineers were made to the city government last January when the petition for an increase was sent to the mayor. Since that time the matter has been under consideration. Several weeks ago the engineers turned to the city property committee and urged that their petition be given early consideration. Both the city property committee and superintendent of buildings H. L. Dorman recommended that the increases be granted, but when the matter came before the finance committee the demands of the men were turned down on the ground that the men while holding ratings as third-class engineers, were really doing the work of firemen and should not be granted $28. No other city employes were affected by the strike order.

State Commissions Want Federal Utilities Administration.

Washington, D. C.—Establishment of a national public utilities administration, to recommend rate increases for certain utilities as a war measure, has been recommended to President Wilson by the National Association of Railway and Utility Commissioners, representing practically all state commissions. This recommendation is similar to that made by the War Labor Board in connection with the awarding of wage increases to employes of a number of street railways. Special significance is attached to the association's proposal, inasmuch as it represents the views of many members of local and state bodies with rate-supervising powers. The association's proposals, contained in a letter to the President, were: "Establishment of a national administrator, or board of three, with power of recommendation, advice, or request to the state and municipal authorities. No disturbance of the rate and service powers of the state commissions or the contractual powers of the municipalities, except as the state or local authorities may subordinate these to the Federal recommendations for the wartime emergency, as we believe would almost uniformly be done. Use of the state commissions by the Federal administrator or board for all purposes of inquiry, investigation, ascertainment, and report of facts, and co-operation in recommendations, where needed, to the local authorities." Any increase in rates granted at Federal instances should be for the war only, it was suggested. The President was told that each application of utilities for rate increases must be considered separately, and that consequently it would be inadvisable for any Federal authority to order a general rate advance.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on muncipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND STREETS.

Concrete:

Concrete Road Resurfaced with Concrete in Good Condition. After two years' service, inspection shows no separation between the base and the three-inch reinforced-concrete cover. 600 words. Engineering News-Record, July 25. 20 cts.

Concrete Pavements. Description of experimental work to ascertain the respective merits of different classes of concrete and different methods of construction. By Murray A. Stewart. 3 ills. 2,600 words. Canadian Engineer, July 18. 15 cts.

Proper Drainage and Adequate Thickness of Bed Important Factors in Concrete Roads. Concrete road maintenance consists mainly of cleaning expansion joints and filling cracks and pit holes with hot tar compounds. 3 ills. 1,100 words. Commercial Vehicle, July 15. 25 cts.

Initial and Maintenance Cost of Concrete Roads Prove Them Most Suitable for Truck Use. Need for uniform method of accounting for construction and repair. Ohio concrete road maintenance given at $137 a mile. 2 ills. 1,500 words. Commercial Vehicle, July 1. 25 cts.

Bituminous:

Ultimate Costs of Bituminous and Water-Bound Macadam Nearly Equal in New York. Highway department investigation indicates total tonnage affects cost but slightly; equation derived for the relation of ultimate cost in traffic tonnage. By Dudley P. Babcock, asst. engr., N. Y. State Highway Dept. 3 ills. 2,700 words. Engineering News-Record, July 11. 20 cts.

Building a Bituminous Pavement with a Concrete Mixture and a Macadam Roller. From paper before Canadian Good Roads Congress. By E. A. Drinkwater. 900 words. Engineering and Contracting, July 3. 15 cts.

Oiling Macadam Streets. Description of approved practice. By E. R. Gray, city engr., Hamilton, Ont. 1,200 words. Engineering and Contracting, July 3. 15 cts.

Stone Block:

Details of Construction of Stone Block Pavements. History and synopsis of best practice. By Arthur H. Blanchard. 10 ills. 2,200 words. Municipal Engineering, July. 30 cts.

Granite Block Between Street Car Tracks Using Cement Mortar Cushion. Description of work at Toronto. 1 ill. 700 words. Engineering and Contracting, July 3. 15 cts.

Other Materials:

Separated Creosoted Wood Block Pavements Laid Directly Upon Concrete Foundation with Bituminous Coating Cushion and Filler. Description of work done in Toledo in 1917. By Frank W. Cherrington. 1,000 words. Engineering and Contracting, July 3. 15 cts.

Graveling Roads in Kane County. Aid given to towns in this Illinois county in the form of use of road building outfits; work done. 2 ills. 1,000 words. Municipal Journal, July 27. 10 cts.

Unusual Types of Roads and Road Structures in Mexico. Brief description of concrete floorings and roads on prairies and through heavy sand. 3 ills. 600 words. Municipal Engineering, July. 30 cts.

Roadway Design:

Superelevations and Easements for Highway Curves. Tables of superelevations and easement offsets prepared and used by the road engineers of King County, Washington. By C. P. Mowry, office engr. of King County. 2 ills. 700 words. Good Roads, July 13. 15 cts.

Notes on Highway Design. Technical discussion of the requirements and planning of subgrades. By J. L. Harrison. 1,200 words. Engineering and Contracting, July 3. 15 cts.

The Evolution of Foundations for Street Car Pavements and Tracks. Outline of the development of practice at Toronto, Ont. 1 ill. 1,200 words. Engineering and Contracting, July 3. 15 cts.

Miscellaneous:

New Division of Dixie Highway Granted. Directors vote to include road between Knoxville, Tenn., and Waynesboro, Ga., in official highway; comes by Asheville and Greenville, S. C. 900 words. Southern Good Roads, June, 1918. 15 cts.

English and American Practice in the Construction of Roads and Pavements. Presented before Fifth Canadian Good Roads Congress at Hamilton, Ont., May 8, 1918. By Arthur H. Blanchard, consulting engr., N. Y. C. 2 ills. 4,800 words. Southern Good Roads, June 1918. 15 cts.

Rapid Curb Construction. Continuous deposit of concrete direct from mixer into forms; mixer travels an average of one hundred feet an hour. 3 ills. 1,500 words. Municipal Journal, July 6. 10 cts.

Tractor-Scraper Outfit on Sidewalk Grading. Work done at Dayton, Ohio. 2 ills. 250 words. Engineering and Contracting, July 3. 15 cts.

Would Rate State Highway Contractors on Past Performance. Propose giving contractor part of saving under estimated cost and advantage in bidding proportionate to speed and efficiency shown. By S. E. Fitch, N. Y. State Hwy. Dept., Hornell, N. Y. 2 ills. 3,300 words. Engineering News-Record, July 18. 20 cts.

Condition of New York Streets. Answer of the Bureau of Highways to criticisms. 500 words. Municipal Journal, July 13. 10 cts.

SEWERAGE AND SANITATION.

Sewage Treatment:

Sewage Treatment in Sedalia. Missouri city employs grit chamber, Imhoff tanks, sludge beds, dosing tank and sprinkling filters to avoid polluting small streams. Damage and injunction suit against city in courts twenty years. 5 ills. 2,000 words. Municipal Journal, July 13. 10 cts.

The Truth About Imhoff Sewage Tanks at Baltimore. Correction of misleading statements; foaming difficulties outlined, insufficient sludge capacity, cause of disease. By Thomas D. Pitts, lately engr. in charge of sewers, Baltimore. 1,200 words. Engineering News-Record, July 11. 20 cts.

Crops Thrive Under Imhoff-Tank Sludge Tests at Dallas. Fertilized cotton and corn twice as high as that unfertilized; soil lightened and evaporation lessened. Farmers interested. By Chas. Saville, Dir. of Sanitation, Dallas, Tex. 900 words. Engineering News-Record, July 25. 20 cts.

Fertilizing Value of Activated Sludge. Result obtained at small experimental plant at Toronto. 1,400 words. Engineering and Contracting, July 10. 15 cts.

Design and Operation of Sewage Treatment Plants. Recommendations prepared by H. A. Whittaker, Director of the Division of Sanitation of the Minnesota State Board of Health. 2,200 words. Municipal Journal, July 6. 10 cts.

Siphon Operates Proportional Chemical Feeder. Displacer automatically proportions feed of chemical in sewage treatment plant; could be used for water. By W. S. Lea, consulting engr., Montreal, Can. 1 ill. 900 words. Engineering News-Record, July 18. 20 cts.

Stream Pollution:

Control of Stream Pollution. Considered as a problem in economics, comparing water purification and sewage treatment. By Earle D. Phelps. 2,700 words. Municipal Engineering, July. 30 cts.

Distribution of Oxygen in Tidal Waters. Investigation by Bureau of Chemistry of U. S. Department of Agriculture. Reasons why less oxygen at bottom than at surface. 1 ill. 800 words. Municipal Journal, July 27. 10 cts.

Miscellaneous:

Preventing Malaria Around Camp Bowie. Work in the extra cantonment zone at Fort Worth, Texas. Conditions that favor mosquito breeding; three methods of control. By W. A. Hardenbergh, Chief Sanitary Engr., U. S. Public Health Service. 1 ill. 2,000 words. Municipal Journal, July 20. 10 cts.

Tests for B Coli. Instructions for making analysis and interpretation of same by Bureau of Sanitary Engineering of California State Board of Health. 1,400 words. Engineering and Contracting, July 10. 15 cts.

Sanitary Drinking Fountains. Report of committee of A. W. W. A. giving fundamental principles to be embodied in such fountains. 500 words. Municipal Journal, July 6. 10 cts.

The Los Angeles New Outfall Sewer. Conduit of plain and reinforced concrete, cast iron pipe and wood-stave pipe, the last carried on a pier extending nearly two thousand feet into the Pacific. Proposed treatment plant. 4 ills. 1,400 words. Municipal Journal, July 6. 10 cts.

Proposed Sewerage Works for St. Augustine. Features of Design by Alvord and Burdick. 1,800 words. Municipal Engineering, July. 30 cts.

WATER SUPPLY.

Water Purification:

Water Purification Plant on Wheels. Portable filter used by the American army in France. 350 words. Municipal Journal, July 13. 10 cts.

New Mechanical Water Filtration Plant at Oshkosh. Description of a 6,000,000-gallon plant, including aeration. By T. B. Jorgensen. 4 ills. 1,500 words. Municipal Engineering, July. 30 cts.

Minneapolis City Water Works, Department of Purification. Statement of work done by the Department with tables of operating data. By F. W. Cappelen, city engr. 4 pages. Canadian Engineer, July 18. 15 cts.

Water Standards of Purity and Necessity of Advertising Value of Pure Water. From paper Chemical and Bacteriological Section of A. W. W. A. By Wm. J. Orchard. 1,800 words. Engineering and Contracting, July 10. 15 cts.

Mechanical Filtration Plant at Lethbridge, Alberta. New low service pumping station and relocation of intake. Heavy loadings placed on soil capable of bearing scarcely half ton per square foot when dry and affected easily by water; filter capacity 3,000,000 gallons daily. By Arthur M. Grace, M. Am. Soc. C. E., formerly commr. of pub. wks., Lethbridge, Alta. 4 ills. 4,200 words. Canadian Engineer, July 4. 15 cts.

Pumping:

Water-Works Pumps with High Efficiencies. 1 ill. 1,200 words. Power, July 9. 10 cts.

Methods and Costs of Pumping for Irrigation in Arkansas River Valley. Summary of practice described by State Agricultural College. 2,000 words. Engineering and Contracting, July 10. 15 cts.

Water Works of Palmerston, Ontario. Existing well being too small for deep-well pumps, centrifugal pump was

placed in deep well. Saving in operating costs. By A. E. Davison, Mgr. of Mun. Dept., Ontario Hydro-Electric Power Commission. 800 words. Municipal Journal, July 13. 10 cts.

Consumption:

Consumption Per Capita or Per Consumer. Advocates giving figures on the consumer basis. 400 words. Municipal Journal, July 6. 10 cts.

"Using High-Priced Coal and Labor to Pump Water to Run into Sewers is Criminal Waste." By Edward E. Wall, water comsr., St. Louis, Mo. 2 ills., 1,700 words. The American City, July, 1918. 40 cts.

Pipe Lines:

Wood-Stave Pipe Built of Local Hemlock in North Carolina. By David R. Shearer, electrical engr., Johnson City, Tenn. 2 ills., 800 words. Engineering News-Record, July 18. 20 cts.

Special Features of Improvements to Main Water Supply Lines of Bayonne, N. J. Special constructions on piling, concrete mat, under railroads, etc. By Nicholas S. Hill. 7 ills., 1,800 words. Municipal Engineering, July. 30 cts.

Operation:

Does Not Pay Under Ordinary Circumstances to Make Extension in Distribution System Unless Annual Revenue Therefrom is Considerably in Excess of 25 per cent of the Cost. John W. Ledoux discusses plant extensions from water works viewpoint, but method he outlines can be used for gas plants as well. 1,800 words. American Gas Engineering Journal, July 27, 1918. 10 cts.

Water Works Operation. Consumption per capita and per consumer, domestic, industrial, commercial and public consumption. Estimating leakage and waste. 1,800 words. Municipal Journal, July 6. 10 cts.

Water Works Operation. Surface indications of leaks not reliable; inspection of sewers and streams. Fall in pressure indicates large leaks. 1,400 words. Municipal Journal, July 13. 10 cts.

Water Works Operation. Determining amount of leakage from gravity or pumping supply mains. Leaks in stream crossings; locating leaks. 1,400 words. Municipal Journal, July 20. 10 cts.

Water Works Operation. Testing for leakage and waste in sections of distribution system. Locating waste in services and leaks in mains. 2,500 words. Municipal Journal, July 27. 10 cts.

STREET LIGHTING AND POWER.

Economy Effected Under Municipal Control of Street Lighting in Medford, Oregon. By L. E. Hinman, city electrician. 4 ills., 1,600 words. American City, July. 40 cts.

Increasing Demand Factor of Residence Consumers. Nine years' records from ten groups averaging 125 customers per group show growth in demand from 20.1 Kw. to 31.4 Kw., or 56 per cent, with an increase in energy use of 50 per cent. By H. B. Gear, Commonwealth Edison Co., Chicago. 2 ills., 1,000 words. Electrical World, July 6. 15 cts.

Estimating Power Requirements of a Locality. By Ludwig W. Schmidt. 2,700 words. Power, July 9. 10 cts.

Estimating the Cost of Underground Conduit. Time spent on preliminary work will be profitable because sub-surface structure interference may double the original estimate. By John F. Mahoney. 6 ills., 1,000 words. Electrical World, July 6. 15 cts.

FIRE DEPARTMENTS.

Fire Departments of the Larger Cities. Some statistics, including those concerning motorization for the year 1917 published by the Census Bureau. 700 words. Municipal Journal, July 27. 10 cts.

The Fire Protection of Industrial Plants. By Philip J. Harty and N. V. Holmes, fire marshals of the Youngstown (Ohio) Sheet & Tube Company and Sears, Roebuck & Co., Chicago. 2 ills., 1,600 words. The American City, July 1918. 40 cts.

Fireman's Big War Garden. Only potatoes to be cultivated on large plot outside Bridgeport. 1,600 words. Fireman's Herald, July 6. 10 cts.

Military Fire Departments. Details of arrangements at Camp Travis and Camp Grant. 900 words. Fireman's Herald, July 6. 10 cts.

N. Y. Firemen "Unionize." 3,600 members of uniformed force join American Federation of Labor. 2,300 words. Fireman's Herald, July 20. 10 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Littering and Conservation. Editorial urging city officials to prevent littering as a war duty. 750 words. Municipal Journal, July 13. 10 cts.

Refuse Disposal at the Cantonments. Description of general plan adopted by the government and money realized therefrom. 700 words. Municipal Journal, July 6. 10 cts.

Army Leads in Waste Prevention and Utilization. Conservation and reclamation division stimulates economy; prolongs life of materials by repairs and salvages wastes. 1 ill. 900 words. Engineering News-Record, July 4. 20 cts.

Salvage of Waste Material in England. Brief description of what is being done by the National Salvage Council. 500 words. Municipal Journal, July 6. 10 cts.

Evolution in Refuse Disposal. Consideration of probable effect of the war on methods of disposing of refuse. 800 words. Municipal Journal, July 6. 10 cts.

Bids for Garbage Disposal at Baltimore. Figures received; part of general plan for improving collection and disposal of municipal waste. 4,000 words. Municipal Engineering, July. 30 cts.

GOVERNMENT AND FINANCE.

Some Things Engineers Serving as City Managers May Be Expected to Meet. Notes based on two years' experience at San Jose; accounting, civil service, legal, health, fire, police, engineering and political problems solved. By Thomas H. Reed, city mgr., San Jose, Cal. 2,400 words. Engineering News-Record, July 25. 20 cts.

The Cities Are Dumb. Editorial urging the organization of cities to secure representation at Washington in decisions on matters affecting their interests. 750 words. Municipal Journal, July 13. 10 cts.

Municipal Revenues and Expenditures. Figures for 1917 published by the Bureau of the Census. 1,000 words. Municipal Journal, July 20. 10 cts.

Shall Cities Have A Voice In Their Own Financing? Editorial commenting upon the omission of municipal representatives from the local Capital Issues Committees. 600 words. Municipal Journal, July 20. 10 cts.

Extension of Public Utilities Financially Considered. Income from extension of pipe line should cover depreciation and profit on plant extensions as well as on additional main laid. By J. W. Ledoux. 2 ills. 1,400 words. Municipal Journal, July 6. 10 cts.

CITY PLANNING.

Building Zones.

Building Zones for Cities. Discussion of advantages of adoption of such zones. 1,100 words. Municipal Journal, July 27. 10 cts.

Zoning as a War-Time Measure. By Chas. Henry Cheney, member American City Planning Institute. 2 ills., 1,800 words. The American City, July 1918. 40 cts.

St. Louis' New Zone Ordinance. City districted according to use to which each district can be put, height of buildings that can be erected in it, and area that can be covered by buildings. 5 ills., 2,800 words. Municipal Journal, July 27. 10 cts.

Zoning as a Protection for Industry and Business. Paper before the National Conference on City Planning. By Herbert S. Swan, exec. secretary, Zoning Committee, New York. 3,200 words. The American City, July 1918. 40 cts.

Housing Projects:

Surveying for Housing Projects. Instructions by Bureau of Industrial Housing and transportation for making topographical surveys and maps of sites for housing developments. 1,500 words. Municipal Journal, July 13. 10 cts.

Engineers and Planners for Housing Projects. List of engineers and town planners appointed in connection with the federal housing projects. 500 words. Municipal Journal, July 20. 10 cts.

How Shipyard Housing Work Is Organized and Operated. Division of Fleet Corporation has developed an organization in which engineers play a large part; sixteen projects under way. 2 ills., 2,200 words. Engineering News-Record, July 18. 20 cts.

Miscellaneous:

Private Industrial District in Chicago Growing. New section gives company 400 acres of modern warehouses and factories with tracks and tractor tunnels. 1,000 words. Engineering News-Record, July 18. 20 cts.

STRUCTURES AND MATERIALS.

Dams:

Improving Arch Action In Arch Dams. By L. R. Jorgenson, M. Am. Soc. C. E. 8 ills., 5,000 words. Canadian Engineer, June 20. 15 cts.

Repair Washout Under Dam by Sheet Pile Cutoff Embedded in Concrete. Hole in cutoff wall and deep erosion of river bed contribute to accident; closure to Coon Rapids dam made rapidly behind steel sheet-pile and timber crib cofferdam in reservoir. Prepared by the staff of H. M. Byllesby & Co., Chicago. 2 ills., 3,200 words. Engineering News-Record, July 25. 20 cts.

Methods for Pressure Grouting of Contraction Joints of Arch Dams. Description in detail of method proposed by L. R. Jorgensen. 3 ills., 2,000 words. Engineering and Contracting, July 10. 15 cts.

The Lesson Taught by the Failure of the Calaveras Dam. Discussion of failure of highest earth dam in the world. 1,800 words. Engineering and Contracting. July 10. 15 cts.

Multiple Arch Dam Built on Rush Creek. Details of a California dam 700 ft. long and 84 ft. high. By Lars Jorgensen. 3 ills., 1,500 words. Concrete, July. 25 cts.

Other Structures:

Precast Concrete Slabs Make Durable Flume. After five years of use vertical sides are in good condition; construction found to be cheap and simple. By S. L. Stovall, Stockton, Cal. 3 ills., 1,300 words. Engineering News-Record, July 18. 20 cts.

Levee Construction in North Texas with Draglines. Details of equipment used, cost, etc. By O. W. Finley. 1 ill., 1,500 words. Engineering and Contracting, July 17. 15 cts.

Sinking 50-ft. Concrete Rings for Pump Pit. Work at new pumping station of San Antonio Water Supply Co., by Wm. W. Hay. 2 ills., 1,700 words. Concrete, July. 25 cts.

Materials:

Effects of Grading of Sands and Consistency of Mix Upon the Strength of Concrete. Increment of strength developed between ages of 90 days and one year not constant and cannot be predetermined. Excess water reduces resistance to abrasion and shock. By Llewellyn N. Edwards. 8 ills., 2,500 words. Canadian Engineer, July 18. 15 cts.

Proportioning the Materials of Mortars and Concretes by Surface Areas of Aggregates. Proper mix for any desired strength can be predetermined; results of tests show that strength of mortars depends upon consistency of mix and upon quantity of cement in relation to surface areas of aggregates. Paper read at Atlantic City Convention of American Society for Testing Materials. By Capt. Llewellyn N. Edwards, supervising engr. of bridges, Toronto, Ont. 8 ills., 3,600 words. Canadian Engineer, July 4. 15 cts.

MISCELLANEOUS.

Heads of Return Loads Bureaus in Six States Get Together for Greater Cooperation. List of truckers operating out of New York and routes covered. 3 ills., 1,000 words. Commercial Vehicle, July 1. 25 cts.

Important Store-Door Delivery Plan Outlined to Relieve New York Terminal Congestion. May go into effect August 15, 1918. All incoming goods will be delivered without notice of arrival and must be accepted. 2 ills., 1,600 words. Commercial Vehicle, July 15. 25 cts.

Solving the Municipal Traffic Problem. Description of conditions in N. Y. C. By R. E. Enright, police comsr. of N. Y. 1,300 words. Good Roads, July 15. 15 cts.

What Commissions Are Doing On Rates. Careful review of conditions in California, where the applications so far cover more than 50 per cent of the electric utility business. Action in other states. 2,800 words. Electrical World, July 27. 15 cts.

Keeping the Utilities Alive. Rate increases continue to be made, but relief is retarded in many cases by the activity of petty politicians. 3,800 words. Public Service, July, 1918. 25 cts.

(*Continued on page* 122.)

NEWS OF THE SOCIETIES

Aug. 27-29.—LEAGUE OF CITIES OF THIRD CLASS IN PENNSYLVANIA. Nineteenth annual meeting, Erie, Pa. Secretary, Fred. H. Gates, city clerk, Wilkes-Barre, Pa.

Sept. 24-27.—INTERNATIONAL ASSOSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Atlanta, Ga. Secretary, Clarence R. George, Houston, Tex.

Oct. 2-4.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual meeting, Buffalo, N. Y. Secretary, Charles Carroll Brown, 304 E. Walnut St., Bloomington, Ill.

Oct. 14-17.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Boston, Mass. Secretary, 126 Massachusetts Ave., Boston, Mass.

Union of Canadian Municipalities.

The eighteenth annual convention of the Union of Canadian Municipalities was held July 9, 10 and 11, in the city hall at Victoria, B. C. Joint sessions were held with the Dominion Civic Improvement League.

At the business session held at 11 a. m., July 9, mayor Todd, of Victoria, welcomed the delegates. President W. D. L. Hardie, mayor of Lethbridge, Alta., delivered the presidential address. The activities of the Union were reviewed by the secretary-treasurer, W. D. Lighthall, ex-mayor of Westmount. O. S. Wilson, assistant secretary, reported on finances and the Union's parliamentary agent, Fred Cook, ex-mayor of Ottawa, gave his report. Reports were then heard from the affiliated provincial unions.

In the afternoon, the convention was formally opened by the premier, Hon. John Oliver. The session was a survey of the effects of the war on the Canadian municipalities, mayor Costello of Calgary speaking for the western cities, and mayor Hawkins of Halifax for the east. There was a general discussion of the effects on the larger cities. Wilfrid Gariepy, Minister of Municipal Affairs, Alberta, took up the question "How Best to Overcome the Difficulties?"

In the evening, a complimentary banquet was tendered to the delegates by the mayor, council and citizens of Victoria. Addresses were made on the subject of "Closer Relations Between the Western and Eastern Municipalities," mayor Gale of Vancouver speaking for the former and mayor Bouchard of St. Hyacinthe for the latter.

At the Wednesday morning session, Thomas Bradshaw, commissioner of finance, Toronto, read a paper on "The Maintaining of Municipal Credit"; W. D. Lighthall, hon. secretary-treasurer of the Union, discussed "The Consolidated Railway Act—Contest Over Fundamental Municipal Rights," and H. J. Ross, chairman of a special committee on the subject, spoke on "Present Position of Uniform Municipal Accounting and Statistics." The Toronto and Niagara Power Company Light was discussed and there were general expressions of opinion on "Federal and Provincial Relations to Municipalities."

In the afternoon, the Dominion Civic Improvement League held its session under the auspices of the Commission of Conservation, alderman W. R. Owen, chairman of the Vancouver board of health, presiding. Thomas Adams, town planning adviser, Commission of Conservation, spoke on "National and Municipal Housing." J. N. Bayne, deputy Minister of Municipal Affairs, Sasketchewan, took up the question of "Municipal Responsibility in Regard to Economic Development of the Land." The problems of the returned soldier and of the necessity of vocational education were discussed generally.

The evening was devoted to a visit to the shipyards and Esquimalt.

The Thursday morning session was devoted to consideration of "How the Cities Can Effectively Assist in the Food Crisis," "Present Position of Municipal Ownership in Canada" and "Western Power and Light Questions."

At noon a luncheon was tendered by the citizens of Victoria and the Rotary Club. Dr. J. S. Plaskett, director, gave an address on the new observatory, which is the second largest in the world. Following luncheon, the delegates took an automobile trip to Saanich, the observatory and Mt. Douglas Park. There was an open-air supper at Cordova Bay and a tea tendered by Oak Bay municipality.

County Engineers and Commissioners of Washington.

The fourteenth annual convention of the Washington State Association of County Engineers and the twelfth annual meeting of the County Commissioners were held in Seattle, July 24, 25 and 26.

On Wednesday afternoon, at the the commissioners' session, after the president's address, Judge Alfred Battle, former president of King County Good Roads Association, spoke on "The Good Roads Movement." E. C. Hughes delivered an address on "Patriotism as Applied to Official Duties."

In the evening, the following papers were read: "Unit Tax Levy," by Wm. Anderson; "Finding a Better Way of Doing Things," by O. E. Bailey; "The Tenure of Office and Salary of County Commissioners," by B. F. Manchester, and "County Bonding for Road Building," by J. C. Boyle.

At the county engineers' session in the afternoon, the following papers were read. "The Road Materials of

(Continued on page 122.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A reinforced concrete RESERVOIR is to be built by Alta, Ia. Plans for the structure are being drawn by the engineer, C. H. Currie.

WATERWORKS IMPROVEMENTS are to be made by Bryan, O., plans being in course of preparation by the engineer, A. H. Smith.

Improvements to the WATERWORKS of Douglas, Kans., are being planned by the consulting engineering firm of Black and Veatch.

WATERWORKS IMPROVEMENTS are to be made by Cashton, Wis., according to plans prepared by the engineer, W. S. Woods.

WATERWORKS IMPROVEMENTS are to be made by Freeport. O., according to plans and specifications completed by the W. J. Sherman Company.

WATERWORKS and a SEWER SYSTEM are to be built by Ponca City, Okla. The consulting engineering firm of Burns & McDonnell has been retained to plan the improvements.

The condition of the BRIDGES across the Willamette river is to be investigated for Multnomah county, Portland, Ore., by the consulting engineering firm of Harrington, Howard & Ash.

In rebuilding a BRIDGE, the town of Spencer, Mass., has the consulting engineering services of S. H. Pitcher Co.

SANITARY SEWERS are to be built by Hawkeye, Ia., plans having been made by the consulting engineer, C. H. Currie.

Improvements to its ELECTRIC LIGHT PLANT are to be made by Appleton City, Mo. Plans for the work were prepared by the consulting engineering firm of W. B. Rollins & Co.

A SEWERAGE SYSTEM to cost about $50,000 is to be built by Del Rio, Tex. O'Neil Engineering Company prepared plans for the improvement.

A POWER DISTRIBUTION SYSTEM and transmission line are to be built by Elkhart, Ia. The engineer for the improvement is E. A. Lankford.

The Inter-River Drainage District, Poplar Bluff, Mo., is to build EARTH LEVEES. Plans and specifications for the work have been completed by the Morgan Engineering Company.

The Conservation Commission of New York state is making a study of STREAM POLLUTION and the commercial UTILIZATION of INDUSTRIAL WASTES. The commission has appointed Dr. Henry B. Ward to make a preliminary survey.

INDUSTRIAL NEWS

Cast Iron Pipe.—Judge Gary, chairman of the Committee on Steel and Steel Products of the American Iron and Steel Institute, has announced a number of price changes. The cast iron pipe schedule as to New York and Chicago is changed to conform to the recent advance in freight rates. The base prices of May 21, 1918, are to read as follows:

$55.00 f.o.b. Birmingham, Ala.
$62.70 f.o.b. New York.
$61.80 f.o.b. Chicago.

These changes are effective as of June 25.

Priority Policies Regulating Steel and Steel Products.

The Priorities Division of the War Industries Board has issued Circular No. 5 to producers, manufacturers, dealers and consumers regarding its policies and regulations governing the distribution of steel and steel products. The circular points out that steel is now the world's most precious metal; that direct and indirect war needs will consume almost the whole producing capacity and that therefore deferrable uses should be deferred. "No consumption is so small as to be immaterial and no saving insignificant." The task of the War Industries board is to so distribute the available supply of iron and steel "as to meet the war requirements and as far as possible the essential needs of the civilian population."

The circular says:

"The priority plan.—The term 'priority' implies discrimination—purposeful discrimination. All priorities are relative and the classifications are based upon the relative importance of the particular industry or the particular plant involved to the war program or to supplying the essential needs (as distinguished from wants) of the civilian population."

Circular No. 4 issued by the Priorities Division of the War Industries Board under date of July 1, 1918, prescribes five principal classes into which all orders and work are divided, with subdivisions thereof, and provides a method for classifying all orders and work.

Priority certificates are issued covering three classes, namely, Class AA, Class A, and Class B. Class C comprises all orders and work not covered by priority certificates or taking a Class A of Class B automatic rating, but which are embraced within the "General Classification of Purposes Demanding Preference Treatment," in Circular No. 4, or which orders and work are placed by or are to be utilized in connection with an industry or plant appearing on Preference List No. 1 prepared by the Priorities Board. In the majority of cases the application of the Classification of Purposes and the Preference List to orders received by manufacturers, jobbers, or received by manufacturers, jobbers, or retailers can readily and accurately be made.

Administrative interpretation of "purpose list."—Communications have been received by the Priorities Committee from manufacturers, jobbers, and retailers expressing doubt as to whether or not certain specified uses fall within the Classification of Purposes entitled to Preference Treatment. In order to insure uniformity and consistency in the distribution of steel and its products, the Priorities Committee will undertake, on application, to decide all such doubtful cases, and from time to time issue as a supplement to this Circular No. 5 administrative rulings embodying such decisions as are of general interest.

On the subject of rationing industries, the circular says: "As it is obviously impossible to supply all industries utilizing iron and steel in their activities with their normal supply, the War Industries Board, through its Priorities Division, cooperating with the commoditiy section dealing with the particular industry or product involved, with the Conservation Division and representatives of other interested Government agencies, has inaugurated a system of industrial hearings in which committees representing the entire industry appear and present (a) the normal requirements of such industry for iron and steel, (b) their reasonable requirements under war conditions, (c) the stocks now on hand in each plant, and (d) the fuel consumed and all other pertinent facts."

A portion at least of the product of nearly every industry may be properly classed as a direct or indirect war requirement or essential to the civilian population, but in many the percentage of nonessentiality predominates. On the other hand, nearly every industry, including so-called war industries, have a percentage of nonessentiality in their production.

It is the policy of the War Industries Board, through the hearings mentioned, to take counsel with each industry, determine the extent to which it can and should as a war measure curtail its production—and particularly curtail its consumption of iron and steel—limiting its output to essential uses as far as practicable, but without destroying or unnecessarily injuring any industry or legitimate business.

On these hearings the chairman of the Conservation Division or his representatives give the industry the benefit of their expert knowledge and research into methods of standardization and substitution, and cooperate with the industry in (a) reducing needless lines, varieties, and sizes of products, thereby securing economy in manufacture and reducing the volume of stocks which the manufacturer, wholesaler, and dealer are required to carry, (b) through the elimination of wasteful styles, models, and methods, greatly conserving materials, and (c) through the substitution of products or materials not needed for those that are needed for war work, conserving the latter without unnecessarily reducing the output of the industry.

When the maximum conservation of materials and products has been attained through these processes of standardization, substitution, and curtailment, the representatives of the War Industries Board participating in these conferences indicate to the industry their views as to the maximum consumption by the industries of the materials and products in question, treating the industry as a unit where such a course is practicable.

The chief of the Commodity Section dealing with the particular industry then prepares a schedule apportioning such indicated maximum of materials or products to each plant on a basis which will enable each member of the industry to procure the same per cent of his normal production as all other members, taking in account the existing stocks of each. When this has been done each plant places its orders for the amount apportioned to it with its regular sources of supply, and such orders take a Class C rating.

The War Service Committees of those industries which have not as yet participated in such hearings will be given an appointment on application to the Priorities Commissioner or to the chief of the appropriate commodity section of the War Industries Board.

Resales will be strictly supervised and all involved are required to pledge themselves to conform with these policies.

The Pitometer Company, New York City, announces that R. G. Jenckes, Jr., has become associated with it, with headquarters at Wheeling, W. Va. Mr. Jenckes was formerly assistant engineer of the Indianapolis Water Co.

The Austin Manufacturing Co., Chicago, Ill., has issued an excellently-prepared and comprehensive catalog, "E," describing the Austin motor road rollers, both macadam and tandem types, and other highway machines in the Austin line. Each type is fully described and interestingly illustrated to bring out the important points of advantage in design and construction. The single and two-cylinder kerosene motor road rollers, the pneumatic scarifier, the road scarifier and the tandem motor roller, are shown, as well as the "Rip-Snorter," the road ripper and the general line, which includes graders, gyratory crushers, "New Era" elevating grader, dump wagon, stone spreading wagon, street sprinklers, pressure road oiler with heater attachment, street sweepers, sprinkler-sweepers, etc. Fine "on-the-job" scenes from all over the world make the new publication of unusual interest.

75,000 Motor Vehicles for Army.

The War Department has announced that the standardization of cargo trucks and passenger automobiles for the use of the army has been completed. More than 75,000 standardized trucks and passenger cars have been ordered. Four trucks and three passenger cars have been selected as suitable for the various requirements of all branches of the service that have been ordered for motor transportation. Of the four trucks selected two are after designs worked out by special boards of automotive engineers. The other two are commercial trucks, which have been changed to meet the special requirements of military work.

The three-quarter to one-ton truck, selected after tests of a number of cars, including a model devised under the supervision of a special board of engineers, is the "G. M. C." truck, which is now known as "Army Type A. A." Changes have been made in the model used by the government. This model will be used not only as a light cargo carrier, but also as a heavy ambulance. About 7,000 of these trucks have been ordered.

The one and a half to two ton truck selected, which, after certain modifications, is now known as "Army A," is the White. The tests of cars in this

class were the most severe of any and extended over a period of one month. Trucks were tested in all conditions of weather and roads, and by a process of elimination the engineering advisory board was left with three trucks. While the board reported that these three trucks were equally serviceable from a strictly technical standpoint, the board of officers which received the findings recommended the adoption of the White.

After competing with a number of well-known makes in the three to five ton class the specially constructed army truck of this class, known as "Type B," was selected as the standard truck of this class, with the recommendation that certain minor changes be adopted by the engineering department of the motor transportation service. One of the principal reasons for the adoption of this truck was maintenance. There had been 18,000 of these trucks ordered, the first 10,000 to be completed by September 1 and the balance by January 1, 1919.

For about a year the engineering ordnance department has been working on improved four-wheel drive type of trucks. Several models were completed, and two of these were tested in arriving at the recommendation that the ordnance model be adopted as the standard for the army. This truck is known as "Army Type T. T.," as it is a tractor truck. It is suitable for the hauling of great guns over rough stretches of road or over open country.

In rejecting many trucks the examiners stated that in no way was their action a reflection on the commercial value of these vehicles. The majority of trucks are made for city work, and as army trucks are called upon to do exceptionally heavy, rough work commercial trucks could not stand up under the strain.

On account of the request from the American Expeditionary Forces for additional Ford machines the Ford chassis (passenger) was accepted as a standard chassis for use of the army, to be used as a passenger car, light truck, light ambulance, and for whatever else desired. There are already approximately 3,000 ambulances of this type in use in France. Under recent request of General Pershing this will be increased to about 8,000, and the Ford company is now working on an order for 5,000 light delivery trucks, production of which began July 22 at the rate of 200 a day.

Two other types of passenger cars have been selected for the use of the army. In connection with the adoption of the passenger cars it was found, after exhaustive tests, that the chassis as now being manufactured for the army by the Dodge and Cadillac companies were best adaptable to army needs. These are not the models now being marketed by those concerns, but a type with certain additions and deductions. These are to be produced in other factories if the needs of the government require.

NEWS OF THE SOCIETIES

(*Continued from page* 120.)

Washington," Morris M. Leighton, state geological survey; "Testing of Road Materials," M. J. Falkenberg, Seattle; "Use of Concrete in Highway Construction," C. N. Reitze; "Advantages of the Use of Corrugated Culverts with the Recent Labor Situation," John S. Beall.

The engineers' evening session was devoted to papers on "State Highway Maintenance Law of 1917" by chief engineer George F. Cotterill of the state highway department and "Development of Federal Aid" by Dr. L. I. Hewes, district engineer for the U. S. Office of Public Roads.

The next day, a number of trips were taken by the members of the association, including inspection tours of road construction of various types.

Southwestern Gas and Electric Association.

Instead of the regular annual conventions the Southwestern Gas and Electric Association has decided to hold quarterly meetings to be rotated between Houston, San Antonio and Dallas. This plan will permit the discussion of problems developing from rapidly changing war conditions more nearly as they arise. The first of these quarterly meetings was held at Dallas, July 19, with general program as follows: The sections (light and power, street and inter-urban railway, and gas) met in the morning separately, each under its chairman, to discuss matters of particular interest to the members. All sections assembled for a get-together luncheon at noon. In the afternoon a general session was addressed by the president of the association on matters concerning practically all utilities in the state. The general secretary's report was also read. All of the meetings are executive. The secretary of the association is H. S. Cooper, 405 Slaughter Building, Dallas, Tex.

PERSONALS

Booth, Harvey, has been appointed city manager of Glasgow, Mont., to succeed Charles H. Blitman, who has joined the aviation corps.

Carr, Ossian E., city manager of Niagara Falls, N. Y., has resigned, effective September 1, and will become city manager of Springfield, Ohio, taking the place of city manager Ashburner who has gone to Norfolk, Va.

Hebenstreit, A. R., has been appointed city manager of Albuquerque, N. M., succeeding Paul G. Redington, who has resumed his duties as district forester in the U. S. Forestry Reserve.

Johnston, J. Newton, has resigned his position of city manager of Ocala, Fla., to accept the position of city engineer at Wilmington, N. C.

Kinghorn, J. Albert, has been elected mayor of Beaufort, S. C., to fill the unexpired term of Charles E. Danner, who died recently.

Watson, M. N., road engineer for the state highway commission of Kansas, has assumed the duties of W. S. Gearhart, state highway engineer for the commission, during his leave of absence for the duration of the war as captain in the Engineer Officers' Reserve Corps.

MUNICIPAL INDEX

(*Continued from page* 119.)

Kansas City Gets Six-Cents Fares. State Commission takes jurisdiction by disposing of constitutional statutory and city charter obstacles. 3,500 words. Public Service. 25 cts.

Car Entrance Street Signs in Pittsburgh. Signs placed directly over stopping places of car entrances. 1 ill., 350 words. Electric Railway Journal, July 13. 15 cts.

The Prevention of Accidents at Grade Crossings. What is being done by the Long Island Railroad. Paper before New York Conference of Mayors. 3 ills., 3,500 words. Good Roads, July 27. 15 cts.

New Contract System Which Stimulates Efficiency Gaining Favor. Method might replace lump sum, percentage and bidding on fee, shifting risks to owner and making certain contractor will devote best efforts to work. By Henry D. Hammond, managing editor, Engineering News-Record. 3,100 words. Engineering News-Record, July 18. 20 cts.

The Massachusetts Cost Plus Profit Road Contract. Description of form of contract used in 1917. 600 words. Engineering and Contracting, July 3. 15 cts.

How American Cities Are Meeting War Problems. Coast-to-coast survey by city engineers; conserving capital, labor and materials, bringing records to date, planning for post-war work. 8,000 words. Engineering News-Record, July 4. 20 cts.

St. Louis Check Public Works But Pushes Post-War Plans. Big sewer and paving programs cut. Local materials go up. Plans for all projects being continued. By W. W. Horner, Chief of Design and Construction, Div. of Sewers and Paving, Bd. of Pub. Serv., St. Louis, Mo. 1 ill., 1,000 words. Engineering News-Record, July 25. 20 cts.

The Engineering Profession in Warfare. How American engineers have responded to the call of the nation; military needs that have been met. Engineering plays an important part from the front to the rear. By Gen. Wm. M. Black, Chief of Engrs., U. S. Army. 1,400 words. Electric World, July 13. 15 cts.

Reconstruction of Devastated Halifax. Under the leadership of Canadian engineers and contractors, splendid maritime port recovers rapidly from the terrible effects of the Mont-Blanc explosion. Description of relief organization and methods. 14 ills., 7,700 words. Canadian Engineer, June 20. 15 cts.

Ditching Work at the Cantonments. Use of a special ditcher employed in Texas and Alabama. 2 ills., 500 words. Municipal Journal, July 27. 10 cts.

The Care of Public Records. By James Sullivan, Dir. Div. of Archives and History, University of the State of New York. 4 ills., 1,800 words. The American City, July, 1918. 40 cts.

Municipal Store and Machine Shop in Los Angeles. Used for construction as well as repairs; asphalt trailers built and sprinkling wagons and fire engines motorized. Repairs automobiles and trucks. Equipment of machine shop; the store division. By Charles W. Geiger. 7 ills., 2,200 words. Municipal Journal, July 20. 10 cts.

Algae Growths Increases Value of n in Kutter's Formula. Studies made in 1912-1916 in Tieton irrigation canal lined with reinforced-concrete blocks indicate that growths raise n from 0.012 to 0.014. By Paul Taylor, asst. engr., U. S. Reclamation Service, North Yakima, Wash. 9 ills., 1,600 words. Engineering News-Record, July 25. 20 cts.

An Unjust Law. Publication, with brief comment of letter from Justice Hughes condemning the recently adopted second class mail regulations. 1,000 words. Municipal Journal, July 20. 10 cts.

ADVANCE CONTRACT NEWS

ADVANCE INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS.	
W. Va.,	Williamson	Aug. 10.	Constructing 8 mi. earth road, involving about 63,000 cu. yds. excavation	E. Boggs, County Clerk
Tex.,	Houston	2 p.m., Aug. 10.	Grading and paving with sheet asphalt, asphaltic concrete, Uvalde rock asphalt or vertical fibre brick	E. E. Sands, City Engr.
Ill.,	Decatur	10 a.m., Aug. 11.	Grading, draining, curbing and paving with brick	J. J. Heger, City Clerk.
Ia.,	Earlville	Aug. 12.	Highway construction to cost about $77,000	County Clerk.
N. Y.,	Albany	1 p.m., Aug. 12.	Completing following highways: 6.88 mi. and 4.73 mi., Cattaraugus Co.; 6.81 mi., Dutchess; 6.03 mi., 9.14 mi., 5.19 mi., Erie Co.; 3.98 mi., Greene Co.; 2.92 mi., Monroe Co.; 5.24 mi., 3.09 mi. and 3.38 mi., Nassau Co.; 8.63 mi., Ontario Co.; 9.18 mi., Orange Co.; 6.33 mi., Schenectady Co.; 4.29 mi., Westchester Co.; timber crib, Montgomery Co.	Edwin Duffey, State Hwy. Comr.
N. Y.,	Albany	1 p.m., Aug. 12.	Completing resurfacing repair contract, two roads in Delaware and Onondaga counties; repairs involve resurfacing in Cattaraugus Co	Edwin Duffey, State Hwy. Comr.
N. Y.,	Albany	1 p.m., Aug. 12.	Completing 4.92 mi. of highway	Edwin Duffey, State Hwy. Comr.
N. J.,	Midland Park	9 p.m., Aug. 12.	Reconstructing highway with portland cement, bituminous concrete or asphalt penetration surface on macadam foundation, involving about 4,217 sq. yds.	McClave & McClave, Engrs., Cliffside, N. J.
N. D.,	Mott	2 p.m., Aug. 12.	Turnpiking	E. C. Robers, Co. Aud.
Ia.,	Manchester	1:30 p.m., Aug. 12.	Grading and graveling 14.65 mi. of road, including 3,480 lin. ft. guard rail and laying about 1,000 ft. 10-in. tile	Merten J. Klaus, Co. Aud.
Tex.,	Canadian	Aug. 12.	Improving roads	J. L. Jennings, Co. Judge.
Tex.,	New Braunfels	Aug. 12.	Reshaping road and bituminous surface treatment	Adolp Stein, Co. Judge.
Cal.,	Sacramento	Aug. 12.	Improving 15.9 mi. road, 24-ft. wide, to cost about $250	State Highway Com.
La.,	Opelousas	Aug. 12.	Constructing 8 mi. of road 24-ft. wide, dirt	F. S. Roberts, Engr.
N. Y.,	New York	noon, Aug. 12.	Regulating and paving with granite blocks; constructing concrete curb with steel guard and laying concrete sidewalks	C. D. Van Name, Boro. Pres., Richmond, St. George, S. I.
Pa.,	Philadelphia	Aug. 13.	Grading two streets; asphalt paving 7 streets and asphalt repaving 2 streets	Geo. E. Datesman, Dir. Pub. Works.
Pa.,	Pittsburgh	11 a.m., Aug. 13.	Grading, paving and improving 8,560 ft. of road	Road Comr., 306 Court House.
Pa.,	Scranton	10:30 a.m., Aug. 14.	Repairing macadam road in Winton borough	C. P. Savage, Co. Controller.
N. Y.,	New York	2 p.m., Aug. 14.	Regulating and repaving with granite block on concrete foundation on three streets	Frank L. Dowling, Boro. Pres. Manhattan.
Wash.,	Buckley	Aug. 14.	Paving street with one-course concrete	W. B. Osbourn, Town Clk.
N. Y.,	New York	10:30 a.m., Aug 15.	Repaving with sheet asphalt on concrete foundation; regulating, grading and regrading, setting and resetting curb, laying and relaying sidewalks and crosswalks, etc., and paving with granite blocks on sand, and granite blocks and asphalt blocks on concrete foundation	Henry Bruckner, Boro. Pres. Bronx.
Ark.,	Paragould	1 p.m., Aug. 15.	12.8 mi. gravel road construction, involving 12, 18 and 24-in. corrugated iron pipe; repairing and reflooring old bridges	W. R. Heagler & Sons, Engrs.
N. M.,	Santa Fe	2 p.m., Aug. 15.	Constructing three miles of road, including corrugated iron pipe	State Highway Commission.
Ind.,	Fort Wayne	Aug. 16.	Guide signs	Will Johnson, Co. Aud.
Wis.,	Lake Mills	7.30 p.m., Aug. 16.	2,444 sq. yds. reinforced concrete pavement and 2,200 ft. combination curb and gutter	V. S. Ravenhill, City Clk.
Ala.,	Tuskegee	11 a.m., Aug. 19.	Road construction	W. S. Keller, State Highway Engr., Montgomery, Ala.
Ill.,	Eldorado	7 p.m., Aug. 19.	Concrete pavement to cost about $25,000	Frank L. Wilcox, Consulting Engr., Syndicate Trust Bldg., St. Louis, Mo.
Mo.,	St. Louis	noon, Aug. 20.	Constructing granitoid sidewalk pavements, 5 ft. wide on 12 streets	E. R. Kinsey, Pres. Board of Public Service.
Utah,	Ogden	Aug. 20.	Constructing 36 miles of road	E. E. Kidder, Hwy. Engr.
Minn.,	Graceville	10 a.m., Aug. 20.	26,566 ft. road construction	Hugh Heily, Town Clerk.
Va.,	Roanoke	noon, Aug. 22.	Macadam street and granolithic sidewalks	A. W. Morris, City Engr.
Ala.,	Geneva	Aug. 26.	10.85 mi. road improvement	W. S. Keller, St. Hwy. Engr., Montgomery, Ala.
Minn.,	Chaska	2 p.m., Aug. 27.	Graveling 26.5 mi. of road	J. B. Connolly, Co. Aud.
Mo.,	St. Louis	noon, Aug. 27.	Improving alleys with concrete and vitrified brick	E. R. Kinsey, Pres. Board of Public Service.
Minn.,	Young America	2 p.m., Aug. 27.	Graveling road	County Clerk.
N. J.,	Trenton	10:30 a.m., Aug. 28.	52,800 sq. yds. concrete surfacing	A. Lee Grover, Chief Clerk State Highway Comsr.
N. Mex.,	Santa Fe	Aug. 31.	Constructing 21.8 mi. state road, including grading and gravel surfacing	State Highway Com.
N. M.,	Santa Fe	2 p.m., Sept. 16.	Constructing 15.5 miles state road, involving 12,084.8 cu. yds. two-course crushed rock surfacing	State Highway Commission.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
SEWERAGE.				
D. C.,	Washington	2 p.m., Aug. 14.	Furnishing and laying sewer pipe, including manholes, at St. Elizabeth's Hospital	Sec. of the Interior.
N. Y.,	New York	2 p.m., Aug. 14.	Repairs and alterations to outlet and barrel sewer	Frank L. Dowling, Boro. Pres. Manhattan.
N. Y.,	New York	10:30 a.m., Aug 15.	Constructing sanitary sewers and appurtenances	Henry Bruckner, Boro. Pres. Bronx.
Wis.,	Plymouth	8 p.m., Aug. 13.	12, 15 and 20-in. storm sewers and 8-in. sanitary sewer, Y's, catch basins and manholes	City Clerk.
Minn.,	Butterfield	8 p.m., Aug. 17.	8,500 ft. 8-in., 2,900 ft. 10-in., 3,000 ft. 12-in. sewer; 200 ft. 10-in., 4,000 ft. 12-in. storm drain and 4,500 ft. 16-in. outfall drain	John F. Enns, Vil. Recorder.
O.,	Lancaster	noon, Aug. 19.	Constructing storm and sanitary sewers	Walter W. Graf, City Civil Engineer.
Cal.,	Newport Beach	Aug. 19.	Sewer system	Paul E. Cressly, City Engr.
S. D.,	Mobridge	8 p.m., Aug. 19.	Sewer system	J. E. Robertson, City Auditor.
Tex.,	Carlsbad	2 p.m., Aug. 20.	Sanitary sewage disposal plant and sewer extension works at state sanatorium	J. B. McKnight, Supt.
Mich.,	Allegan	Aug. 22.	Drain construction	D. J. Round. Co. Drain. Comr.
N. Y.,	Albany	2:30 p.m., Aug. 29.	Sewerage system at Sing Sing prison, Ossining, N. Y.	Lewis F. Pilcher, State Archt.
WATER SUPPLY.				
Conn.,	New London	Aug. 12.	Constructing fresh water line, to cost about $70,000. Specification No. 3,225)	Bur. of Yards & Docks, Navy Dept., Washington, D. C.
Wis.,	Cashton	8 p.m., Aug. 12.	80,000 gallon steel tank and tower	W. S. Woods, Engr., Batavian Bank Bldg., La Crosse, Wis.
N. Y.,	New York	11 a.m., Aug. 12.	Hauling and laying 12-in. flexible jointed water main across creek and hauling and laying connected mains and appurtenances	Nicholas J. Hayes, Comr. Water Supply, Gas & Elec.
Colo.,	Denver	2 p.m., Aug. 12.	Direct pumping unit for pumping plant, Grand Valley project	U. S. Reclamation Service.
N. J.,	Jersey City	2 p.m., Aug. 13.	Furnishing and delivering 34,590 feet 72-inch riveted steel pipe	Clyde Potts, Engr., 30 Church St., N. Y. City.
N. J.,	Jersey City	2 p.m., Aug. 13.	Hauling, excavating and laying 34,590 feet 72-in. riveted steel pipe	Clyde Potts, Engr., 30 Church St., N. Y. City.
Minn.,	Crosby	8 p.m., Aug. 13.	Water works extension, consisting of about 14,680 ft. 6-in., 9,990 ft. 4-in., 547 ft. 8-in. cast iron pipe; 45 fire hydrants, 37 6-in. gate valves, 25 4-in. gate valves, etc.	John Wilson, Engr., Duluth, Minn.
O.,	Eaton	8 p.m., Aug. 14.	Water works improvements, including pump and motor power	Water Wks. Office.
O.,	Wooster	noon, Aug. 14.	Constructing deep well for water supply	Vern M. Skelly, City Clerk
O.,	Wooster	noon, Aug. 14.	Construction of booster station, including machinery	Vern M. Skelly, City Clerk
N. J.,	Boonton	8 p.m., Aug. 14.	Constructing water works improvements in three sections; constructing pumping station complete, including 2-in. and 4-in. electrically driven direct connected centrifugal pumps; constructing 20-ft. extension to top of present steel standpipe, including painting; furnishing and laying about 3,000 ft. 6-in. cast iron pipe, including necessary valves, hydrants and fittings	Clyde Potts, Engr., 30 Church St., N. Y. C.
S. D.,	Pierre	Aug. 15.	Equipment for improving water system	Kenningson Eng. Co., Omaha, Neb.
Ill.,	Jacksonville	Aug. 15.	Constructing dam 500 ft. long, 22 ft. high; concrete spillway, channel and filter plant	S. A. Greeley, Engr., 64 West Randolph St., Chicago, Ill.
N. J.,	Trenton	2.30 p.m., Aug. 16.	Furnishing and installing 25,000,000 gal. steam driven centrifugal pump; 20,000,000 gal. electrical driven centrifugal pump; 1 generator; 1 motor, appurtenances, connections, etc.	Alvin Bugbee, Supt. Water Works.
Sask.,	Sutherland	noon, Aug. 16.	Constructing water supply system	R. C. Desrochers, Sec. Dept. Pub. Wks., Ottawa.
Sask.,	Regina	1 p.m., Aug. 17.	Excavating for reservoir	H. S. Carpenter, Deputy Minister of Hwys.
Ont.,	Leamington	Aug. 20.	Constructing concrete reservoir	R. M. Selkirk, Town Clk.
S. D.,	Pierre	7 p.m., Aug. 26.	Power plant equipment for water works as follows: Two 200 r. p. m. Unaflow engines for direct connection with generators (two alternatives); two 312 (or 250) k. w. 3-phase, 60-cycle, 2,400-volt, 200 r. p. m. a. c. generators, complete with exciters; one 7-panel switchboard; one 35-k. v. a. 6.6 ampere, constant current, series transformer; two 250-h. p., 165 lbs. working pressure water tube boilers; two 8x5x12 Simplex boiler feed pumps; two 300-h. p. open type feed water heaters, one condenser equipment 9,000 steam per hr.; one triplex pump, surface type, 13x12, 150 lbs. working pressure; one chimney (concrete, common brick or radial brick) 125 ft. high; one brick power plant building with concrete coal bin; one 750,000-gal. concrete reservoir	Henderson Engr. Co., Omaha, Neb.
N. Y.,	Albany	2:30 p.m., Aug. 29.	Water supply system at Sing Sing prison, Ossining, N. Y.	Lewis F. Pilcher, State Archt.
O.,	Sandusky	noon, Aug. 30.	Constructing and erecting two water tube boilers and connections; brick work; 400 hp. open feed water heater	Geo. M. Zimmerman, City Mgr.
LIGHTING AND POWER.				
Pa.,	Philadelphia	Aug. 12.	Constructing extensions to boiler plants and heating systems in emergency barracks (spec. No. 3326), to cost about $130,000	Bur. of Yards and Docks, Navy Dept., Washington, D. C.
La.,	New Orleans	Aug. 12.	Boilers and superheaters at Navy Yard (Spec. No. 3165)	Bur. of Yards and Docks, Washington, D. C.
D. C.,	Washington	Aug. 12.	Constructing power plans extension and improvements at naval station, Pearl Harbor, to cost about $150,000	Bur. of Yards & Docks, Navy Dept., Washington, D. C.
Okla.,	Stillwater	5 p.m., Aug. 12.	250 kva., 2,300 volt, 3-phase generator, one exciter, switchboard, one 16 kva., 6.6 amp. constant current transformer, 300 hp. 150 lb. steam pressure boiler and 400 hp. open heater	J. L. Moore, Comr. of Revenu & Accounting.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
D. C.,	Washington	Aug. 16..	Switchboards, three-wire (Proposal No. 1,064)	General Engr. Depot., U. S. Army, 1438 U. St.
N. Y.,	Albany	2:30 p.m., Aug. 29..	Additions to central heating plant; underground piping and conduit work; feeder system at Sing Sing prison, Ossining, N. Y.	Lewis F. Pilcher, State Archt.

BRIDGES.

Wash.,	Cathlamet	Aug. 10..	Bridge construction	J. E. Thorndike, Co. Engr.
N. D.,	Carson	Aug. 12..	Constructing a number of concrete bridges and abutments, 18 to 36 ft. long	County Commissioners.
Cal.,	Sacramento	Aug. 12..	Constructing culverts and retaining walls on highway project	State Highway Com.
Sask.,	Regina	10:30 a.m., Aug. 12..	Four reinforced concrete bridge abutments for two bridges	H. S. Carpenter, Deputy Minister of Bridges.
Minn.,	St. Peter	8 p.m., Aug. 12..	2,900 ft. bridge stringers and 4,500 ft. bridge flooring	M. E. Stone, City Clerk.
N. D.,	New Leipzig	10 a.m., Aug. 12..	Constructing bridges	Robert D. Berry, Co. Auditor.
Pa.,	Laceyville	Aug. 13..	Constructing bridge	G. A. Schreiner, Supt. of Pub. Grounds, Capitol Bldg., Harrisburg, Pa.
Pa.,	Falls	Aug. 13..	Constructing bridge	G. A. Schreiner, Supt. of Pub. Grounds, Capitol Bldg., Harrisburg, Pa.
W. Va.,	Petersburg	Aug. 13..	Constructing one 20-ft., one 30-ft. and one 40-ft. span bridges	D. P. Hendrickson, Co. Clerk
Pa.,	Harrisburg	2 p.m., Aug. 13..	Constructing bridge	Geo. A. Shreiner, Supt. Public Grounds and Bldgs.
Pa.,	Franklin	Aug. 13..	Constructing bridges	County Comptroller.
Minn.,	Willmar	2 p.m., Aug. 14..	Constructing state bridge, 30 ft. beam span reinforced concrete abutments	Samuel Nelson, Co. Aud.
Minn.,	Granite Falls	2 p.m., Aug. 14..	Bridge construction	G. H. Wilson, Co. Aud.
W. Va.,	Middlebourne	Aug. 14..	Concrete arch bridge, 60 ft. long	P. P. Berkley, Co. Road Engr.
N. J.,	Atlantic City	11 a.m., Aug. 14..	Constructing foundation work, abutments, wing walls, approaches, etc., in reconstructing old bridge	A. H. Nelson, Co. Engr.
W. Va.,	Spencer	Aug. 15..	Moving two steel bridges, rebuilding them and building a number of new bridges	W. A. Carpenter, County Clk.
N. J.,	Lambertville	Aug. 15..	Constructing bridge 40 foot span	Grant Davis, Co. Engr., White House Station.
O.,	Toledo	10:30 a.m., Aug. 16..	Constructing two culverts	Gabe Cooper, Co. Aud.
Cal.,	San Jose	11 a.m., Aug. 19..	Constructing reinforced concrete bridge	Henry A. Pfister, Clk. Bd. of Co. Supervisors.
Cal.,	Los Gatos	11 a.m., Aug. 19..	Constructing reinforced concrete bridge	Co. Surv.
Ind.,	Evansville	10 a.m., Aug. 26..	Constructing five and repairing one reinforced concrete bridges	C. P. Beard, Co. Auditor.
N. M.,	Santa Fe	2 p.m., Sept. 16..	120-ft. steel span bridge; four 31-ft. six 21-ft., five 12-ft. and one 10-ft. timber trestles; 18 to 42-in. corrugated iron culverts	State Highway Commission.

MISCELLANEOUS.

Md.,	Baltimore	2 p.m., Aug. 12..	Constructing concrete foundation and placing riprap at light station	Supt. of Light Houses.
Mo.,	Poplar Bluff	Aug. 12..	Constructing 36 miles new levees to protect 120,000 acres, involving 1,216,000 cu. yds. excavation, building bridges, etc., to cost about $850,000	Morgan Engr. Co., Goodwyn Inst., Memphis, Tenn.
N. Y.,	Albany	noon, Aug. 13..	Placing wash wall protection along canal banks	Frank M. Williams State Eng.
Pa.,	Lawrenceville	Aug. 13..	Straightening alignment and strengthening dyke	T. J. Lynch, Sec. Water Supply Comrs.
D. C.,	Washington	10:30 a.m., Aug. 14..	Galvanized pipe, brass tubing, storage batteries, leather and canvas belting, pipe covering, automobile tires and tubes, fire and water hose, tar, etc.	A. L. Flint, Genl. Pur. Officer for Panama Canal, Washington, D. C.
N. Y.,	Albany	Aug. 20..	Constructing terminal freight house on barge canal at Buffalo; improving terminal site at Troy, and completing excavation at Oswego	W. W. Wotherspoon, Supt. Public Works.

ROADS AND STREETS

Rock Island, Ill.—Ordinance passed for grading and widening of 20th Ave., between 16th and 17th Sts.

Greenfield, Ind.—Bids received Aug. 12, 1918, at 10 a. m., by treasurer of Hancock county, for sale, $13,700 and $17,800 highway improvements bonds. Thos. A. Seaman, treasurer.

Muncie, Ind.—Board of works ordered bids advertised for a sidewalk on 13th St. from Jefferson to Madison.

Valparaiso, Ind.—Bids received Aug. 24, 1918, at 10 a. m., by trustee of Center Twp., Porter county, for sale $8,000 highway improvement bonds. Vernon E. Beach, trustee.

Wichita, Kan.—Ordinance approved authorizing the construction of the curb and gutter on Seneca St. from Central Ave. to River boulevard; cost about $1,000. L. W. Clapp, mayor.

Opelousas, La.—St. Landry Parish President Police Jury F. Octave Pavy will take bids Aug. 12 for an issue first road district bonds, $25,000.

Baltimore, Md.—Contract soon let by city for grading, curbing and paving Parkdale Ave. from Woodbery Ave. to Druid Hill Park, and Dukeland St. from Wilken Ave. to southern city line, involving 4,800 sq. yd. cement concrete, 4,450 sq. yd. sheet asphalt, 3,100 lin. ft. curb, 350 sq. yd. gutter and 3,800 cu. yd. grading. R. M. Cooksey, city engr.

Boston, Mass.—Contract soon let by board public works for paving State St., granite block, grout joint, concrete base, about $40,000.

Detroit, Mich.—Plans to pave Glendale Ave. from 12th to Ellen Sts., about $15,000. C. W. Hubbell, city engr.

Detroit, Mich.—H. H. Esselstyn, commissioner of public works, and the council street committee asks competitive bidding for city paving, single bids for the paving of about a dozen streets and alleys were rejected and will be readvertised.

Lansing, Mich.—City council adopted plans and specifications of city engineer for curb and gutter in Seymour Ave. from Saginaw St. to Madison St.

Saranac, Mich.—For constructing trunk lines road, between here and Lowell, and for the 2½-mile link in the northeast part of the Ionia-Belding road, state highway department rejected all bids. Work is being readvertised.

Kansas City, Mo.—For paving Washington St. from 16th to 20th Sts., all bids were rejected July 19.

Auburn, Neb.—All bids rejected for grading and improving 57.25 mi. state and federal aid project No. 2 in Nemaha county, involving 258,000 cu. yd. excav., 560 cu. yd. hauling and surfacing material, 1,175 ft. 18-36-in. concrete pipe, 230 cu. yd. concrete, etc., about $74,928.

Gandy, Neb.—For grading and improving of Federal aid project No. 12, and incidential work on same, involving about 70,030 cu. yds., cost $36,217, all bids were rejected July 30 by John Armour, clerk, Longan county. Will readvertise.

Lincoln, Neb.—Lancaster County Clerk A. E. Sutherland receiving sealed bids on Aug. 19 paving district No. 17 bonds, $27,000.

Elizabeth, N. J.—Harris, Forbes & Co. of New York were the successful bidders for an issue of Union county $231,000 road, bridge and hospital bonds, taking $229,000. N. R. Leavitt, county collector.

Newton, N. J.—County Engineer William Harden informed by the state road department that Sussex county will receive $50,000 state road aid and is immediately available. The outcome forecast will be that the freeholders will advertise for bids to authorize the improvement of three of the four miles of the Sparta-Ogdensburg road. The total cost will come to about $130,000. The road will have a 30-ft. right of way with an 18-ft. tarvia pavement.

Trenton, N. J.—The executive committee of the highway commission recommended that steps be taken at once to make permanent repairs to the Bordentown end of the Camp Dix road, which is now in poor shape.

Trenton, N. J.—In approving a pro-

gram for construction work on the state highway system next year, the state highway commission decided to follow the policy adopted this year by giving first consideration to roads used for military purposes and for transportation incident to the carrying on of the war. The sections of roadway comprising next year's program were recommended in a report submitted by State Highway Engineer William G. Thompson. They are briefly as follows: Robbinsville to the Mercer county line, above Hightstown, in Route 1; Florence road to Bordentown in Route 2, Da Costa to Egg Harbor in Route 3, Amboy bridge to Broadway, South Amboy, and Stevens Point to the brick pavement leading to Morgan in Route 4; Mullica Hill to Woodstown in Route 6, from a point near Mountainview toward Butler in Route 8; the straightening of Worth Ave., Westfield, in Route 9; from Anderson Ave. westerly to Grand Ave., Ridgefield, in Route 10, and from Sally Marshall's crossing to Cape May Court House in Route 14.

Trenton, N. J.—Board state highway commission rejected the bid for constructing the Burlington-Roebling section of Route 2, a distance of 5 miles, for $292,628. The bid was 20.2 per cent. in excess of the estimate of the board's engineer.

Trenton, N. J.—State highway commission, upon request of the borough of Bound Brook, appropriated $5,000 toward the improvement of Union Ave., a part of the state highway system. A like amount will be contributed by the borough.

Bethlehem, N. Y.—Town voted in favor of issuing $5,000 highway bonds. S. W. Corning, town clerk.

Lockport, N. Y.—City sold to the Niagara County National Bank of Lockport improvement bonds, $10,500. E. H. Boynton, city treasurer.

Mineola (L. I.), N. Y.—Nassau county board of supervisors has arranged for the improvement of Kirkwood Ave. west to Main St. on the Merrick road, Freeport. W. Fred Starks, the county superintendent of highways, will be the engineer in charge.

New York, N. Y.—All bids rejected for regulating and repaving with sheet asphalt on concrete foundation Division St. from point west of Pike St. to Essex St. F. L. Dowling, boro. pres. Manhattan boro.

Tonda, N. Y.—Board of supervisors of Montgomery county passed resolution ordering the work on the Fort Johnson-Johnstown Rd. to begin at once. Frequent washouts have caused the state to suggest that abutments be built at the points where they occur. Will be constructed of timber. Cost, $9,000.

Charlotte, N. C.—City will soon advertise for bids for the resurfacing of the bitulithic pavement within the fire limits of the city. Commissioner A. H. Wearn.

Goldsboro, N. C.—Graves, Blanchet & Thornburgh of Toledo were the successful bidders for the following bonds, aggregating $90,000: Paving, $40,000; water, $35,000; sewer, $15,000. C. M. Grantham, city clerk.

Mooresville, N. C.—Sidney Spitzer & Co., of Toledo, purchased an issue of street improvement bonds to the amount of $26,844.50. J. L. Donald, supt. town commissioners.

Bryan, O.—William county, Auditor Chas. R. Lowe, receiving bids Aug. 26 for the purchase bonds, $58,000, expenses of the construction and improvements of public highway, being a part of Main Market road No. 1 in St. Joseph township.

Columbus, O.—Clinton Cowen, state highway commissioner, receiving bids Aug. 9, for improvements in Clark county on section "F" of the National Road I. C. H. No. 1, petition No. 3197, in Springfield and Harmony townships for grading roadway, constructing bridges and culverts and paving with one of the following types: Plain concrete, estimated cost of construction $133,826.44; National pavement, estimated cost of construction $113,414.34; bitulithic, estimated cost $131,592.64; bituminous concrete, Sec. 6, 2, A2 (a) $118,032.34; bituminous concrete, Sec. 6, 2, A2 (c) $118,-032.34; width pavement 16 ft., roadway 30 ft., length 29,039 ft., or 4.93 miles. Date set for completion on any type Dec. 1, 1918. Clark county on Secs. (g) and "H" of the National Road, I. C. H. No. 1, petition Nos. 3201 and 3198, in Harmony township, for grading roadway, constructing bridges and culverts and paving with one of the following types: Plain concrete, estimated cost of construction, $117,278.84; National pavement, estimated cost of construction, $97,371.74; bitulithic, $114,052.18; bituminous concrete, Sec. 6.2, A2 (a) $101,561.54; bituminous concrete, Sec. 6.2, A8 (c) $101,-561.54; width, pavement 16 ft., roadway 30 ft., length 23,567.5 ft., or 4.46 miles. Date set for completion Dec. 1, 1918. Lawrence county on section "K" of the Ohio River Road, I. C. H. No. 1, petition No. 2566, in Union township. For grading roadway, constructing bridges and culverts and paving with gravel; width, pavement 16 ft., roadway 26 ft., length 5,130 ft., or 0.97 mile; estimated cost of construction, $12,858.95. Date set for completion, Dec. 1, 1918. Logan county on section "A-2" of the Bellefontaine-Lima road, I. C. H. No. 130, petition No. 3143, in Harrison township, for grading roadway, constructing bridges and culverts and paving with reinforced concrete; width, pavement 16 ft., roadway 26 ft., length 8,160 ft., or 1.55 mile; estimated cost of construction $45,922.91. Date set for completion, Aug. 1, 1919. Lucas county on section "J" of the Toledo-Wauseon Road, I. C. H. No. 20, petition No. 3204, in Adams township, for grading roadway, constructing drainage structures and paving with concrete; width — ft., or 2.08 miles; estimated cost of construction $48,400. Date set for completion July 1, 1919. Lucas county on section "K-1" of the Toledo-Wauseon Road, I. C. H. No. 20, petition No. 3204, in Adams township. For grading roadway, constructing bridges and culverts and paving with concrete; width, pavement 16 ft., roadway 26 ft., length 5,553.3 ft., or 1.05 mile; estimated cost of construction $23,150. Date set for completion Dec. 15, 1918. Lucas county on section "I" of the Toledo-Wauseon Road, I. C. H. No. 20, petition No. 3204, in Springfield and Adams townships, for grading roadway, constructing bridges and culverts and paving with concrete; width, pavement 16 ft., roadway 26 ft., length 13,631 ft., or 2.58 miles; estimated cost of construction $62,450. Date set for completion July 1, 1919. Plans and specifications are on file in the office of the resident engineer and the state highway department.

Lima, O.—Hornblower & Weeks of New York were the successful bidders for the issue Elizabeth St. opening bonds, $45,-000. Secretary sinking fund trustees.

Norwalk, O.—County Auditor W. H. Griffin has been informed that the committee of capital issues at Washington has approved the sale of $98,000 bonds for the improvement of 4½ miles of Market road, northwest of Monroeville.

Struthers, O.—Village Clerk S. J. McNab will take bids Aug. 21 for the following bonds: Lowellville road assessment, $19,499.56, and Lowellville road improvement (village's part), $3,430.21.

Troy, O.—Miami county received no bids July 29 for an issue inter-county highway bonds, three issues, aggregating $16,000. C. N. Peters, county auditor.

Van Wert, O.—Van Wert county sold to the First National Bank of Van Wert the following bonds: Jackson township road No. 199, $7,026.38, and Jackson township road No. 175, $5,000. Chas. W. Ringer, county clerk.

Zanesville, O.—Muskingum Co. $17,500 state aid road improvement bonds were sold to the Hanchett Bond Co. of Chicago. B. O'Brien, assistant clerk county commissioners.

Aurora, Ore.—County Commissioner W. H. Goulet, of Woodburn, expressed the opinion that the paving of 17 miles of the Pacific highway early next spring is one of the practical certainties among the highway commission's projects. The stretch to be paved will be from Aurora to the Salem side of Lake Labish, which will leave a stretch of three miles from Lake Labish to the north end of the paving already done. It is believed that the Government will demand a new bridge across Pudding river at this place as a part of the post road, which the government has declared the 17 miles to be. It is probable that the road will be paved directly through Aurora, as the courts have decided that a county road through an incorporated town remains a county road.

Astoria, Ore.—Morris Bros., Inc., was the successful bidder for the $73,200 of 6 per cent. street improvement bonds issued by the city.

Portland, Ore.—No bids received July 17 by district engineer of public roads and rural engineering for constructing the Ochoco Canyon road in Cook county, involving cleaning, grubbing, excavating, bridges and culverts; length of road about 9.5 miles.

Harrisburg, Pa.—State highway department received no bids Aug. 1 on the following work; will readvertise: Blair county, Duncansville borough, state highway route 53, 5,443 ft.; Elk county, St. Marys borough, Ap. 415, 4,566 ft.; Fayette county, Springhill, Georges and Nicholson townships, state highway route 116, 25,112 ft.

Philadelphia, Pa.—Dept. of pub. wks., bureau of highways, City Hall, work valued at approximately $75,000, for which bids will be received on Aug. 13, 1918: Schedule A, grading Bellfield from Broad to York road; 18th St. from Johnston to Moyamensing Ave. Schedule B, asphalt paving, assessment work: Almond from Tioga to Ontario; Lansdowne from 64th to 65th; Morris from Berkley to Apsley; Rockland from 4th to Boulevard; Ruby from Florence to Warrington; Tacony (subject to future—angle about 224 ft., about 375 ft. appropriation) S. W. of Sanger St. to N. E. of Sanger St.; Warrington from 53d to 54th. Schedule C, asphalt repaving: Leland from Poplar to Guinado; 28th from Tasker to Morris.

West Alexander, Pa.—Secretary Borough Council T. S. Maxwell receiving bids Aug. 15, street improvement bonds, $15,000.

Angleton, Tex.—To build roads in district No. 2, Braboria county, voted $70,-000 bonds.

Athens, Tex.—Henderson county voted $110,000 bonds to build roads in districts Nos. 3 and 11.

Bay City, Tex.—Matagorda county will vote on Aug. 17 road improvement district No. 8 bonds, $75,000.

Boerne, Tex.—Kendall County Judge J. W. Lawhon will take bids Aug. 12 for an issue road district No. 3 bonds, $38,-000.

Cisco, Tex.—Contracts soon let for paving various streets, involving 6,000 sq. yds. asphalt macadam pavement on concrete. H. J. Bradshaw, city engr.

Galveston, Tex.—The navy department will construct here a naval aviation training station, cost approximately $2,-000,000; plans are complete in every detail. Roadways will be built, water and electric lights installed, and a spur railway track built to the base.

Hillsboro, Tex.—Hill county will vote Aug. 24 on $2,900,000 bond issue to build a concrete road across the county, north and south, on the King of Trails.

Palestine, Tex.—$50,000 bond issue voted by Anderson county to build roads in district No. 2.

Ogden, Utah—According to County Commissioner M. P. Brown and the officers of the improvement committee of Hooper work is to start by Sept. 1 on the road from Ogden City to Hooper, which has been made a post road over which United States mails are to be carried. The construction devolves on the federal, state and county authorities, who have now worked out all the details. Weber county contributes $10,000, the state $10,000, and the federal government $20,000 in meeting the expense of construction. State Engineer R. Browning.

Kirkland, Wash.—Town council recently decided to proceed with the improvement of Calhoun St. Cost, $1,500.

Hoquiam, Wash.—Ester E. Lundin, city clerk, reports council passed resolution for improving Karr Ave. by removing plank roadway and replacing with 16-ft. rock and gravel.

Yakima, Wash.—By cooperation of reclamation, mining and county interests, sum of $4,000 will be spent immediately to place the road to Bumping Lake in shape for auto traffic.

Seattle, Wash.—Board of public works received plans from City Engineer Dimock for paving Gilman Ave. and filling and paving Fourth Ave., South, concrete walks on Orcas St. et al., paving First Ave., water mains E. Marginal way, sewers in 59th Ave., S. W. et al.

Seattle, Wash.—Resolution adopted declaring intention of council to order improvement of Beacon Ave. from Hanford St. to Spokane St., by paving, etc., and setting Aug. 19, 1918, as a date for hearing.

Seattle, Wash.—The following resolutions were referred to streets and sewers committee: Concrete walks on 42d Ave. S. from Court St. to Genesee St., paving, etc., of King St. from Fifth to 12th Aves. S.; Weller St. from Fifth Ave. to Maynard Ave.; Lane St. from Fifth Ave. S. to Seventh Ave. S.; Fifth Ave. S. from Jackson to Dearborn Sts.; Maynard Ave. from Weller St. to Seattle Blvd.; Seventh Ave. S. from Dearnborn to Charles Sts.

Elkins, W. Va.—Randolph county plans to grade, drain and surface 1½ mi. Huntsville Pike and 1 mi. Beverly and Fairmount Pike 9 ft. wide, macadam. Work includes underground cattle pass, about $13,916. F. A. Parson, county engr.

Blenheim, Ont.—Construction of a good highway to the village of Erieau is favored by a special committee of Kent county council. Letson Pardo, county road superintendent.

North Hatley, Que.—Town council considering construction of roadwork; $15,000. J. B. LeBaron, mayor.

Hamilton, Ont.—City council considers building asphalt pavements costing $9,000. E. R. Gray, engr.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Florance, Ala.—*Southern Bitulithic Co., Nashville, Tenn., for paving Court St., about $175,000.

Edgemoor, Del.—*Jas. McGraw Co., Commercial Trust bldg., Philadelphia, & D. L. Taylor Co., 1515 Fidelity bldg., Baltimore, Md., grading, masonry and tracklaying, $50,000, by Penna. R. R. Co. A. C. Shand, 701 Broad St. Station, Philadelphia.

Ventura, Cal.—*Fairchild, Gillman, Walter Co., Pacific Electric Bldg., Los Angeles, Cal., for paving Main St. and Ventura Ave., at $29,806.

Grangeville, Ida.—Eslick & Daniels low bidders for constructing about 18 miles of road work near here in Idaho county.

Chicago, Ill.—*Central Paving Co., 179 Washington St., (a) $4,674; *Marquette Constr. Co., 133 West Washington St., (f) $4,555, (g) $4,460; *P. J. O'Brien Co., 29 South La Salle St., (d) $3,291, (l) $2,784, (m) $2,249, (o) $3,688, (p) $3,041; *J. A. Ross & Co., 4561 Armitage Ave., (b) $752; *Schmidt Constr. Co., 135 West Washington St., (c) $3,392, (e) $2,686, (j) $2,761, (k) $3,232, (n) $3,202; *Contg. & Material Co., 10 South La Salle St.; *J. A. Dillon & Co., 179 West Washington St., (h) $1,205, (i) $990; *R. F. Conway Co., 133 West Washington St., (q) $32,587; *American Asphalt Paving Co., 133 West Washington St., (r) $10,870, (s) $85,877, paving alleys and streets as follows: (a) alley between Bryn Mawr, Catalpa Aves., Broadway, and Magnolia St., involving 1,288 ft. concrete curb and gutter, 385 cu. yds. grading, 1,000 sq. yds. vitr. brick pavement on 6-in. concrete base; (b) alley between Darwin Terrace, Edgewood, Kedzie and Albany Aves., 100 cu. yds. grading, 250 cu. yds. 7-in. concrete pavement; (c) alley between Dwersey Ave., Schubert, Mozart Sts. and Francisco Ave., 280 cu. yds. grading, 986 sq. yds. 7-in. concrete pavement, 260 ft. 10-in. tile pipe sewer; (d) alley between Van Buren, Congress Sts., Hamlin and Springfield Aves., 389 cu. yds. grading, 1,190 sq. yds. 7-in. concrete pavement; (e) alley between Harrison, Flournoy, Leavitt Sts. and Hoyne Ave., 210 cu. yds. grading, 1,040 sq. yds. 7-in. concrete pavement; (f) alley between Pierce, Le Moyne Sts., Spaulding and Homan Aves., 1,201 ft. concrete curb, 350 cu. yds. grading, 935 sq. yds. vitr. brick on 6-in. concrete base; (g) alley between Carroll, Fulton, Elizabeth and Ada Sts., 903 ft. concrete curb, 400 cu. yds. grading, 803 sq. yds. vitr. brick on 6-in. concrete base; (h) alley between Maxwell, Liberty, Union Aves. to 127 ft. east, 400 ft. concrete curb, 100 cu. yds. grading, 200 sq. yds. vitr. brick on 6-in. concrete base; (i) first alley west of Jefferson St. from Maxwell to Liberty St., 360 ft. concrete curb, 80 cu. yds. grading, 160 sq. yds. vitr. brick on 6-in. concrete base; (j) alley between Arthington, Taylor Sts., Francisco Ave., Sacramento Blvd., 266 cu. yds. grading, 1,040 sq. yds. 7-in. concrete pavement; (k) alley between Fillmore, Greenshaw Sts., Spaulding and Homan Aves., 338 cu. yds. grading, 1,220 sq. yds. 7-in. concrete pavement; (l) alley between Fuornoy, Levington Sts., Sacramento Blvd. and Albany Ave., 274 cu. yds. grading, 1,040 sq. yds. 7-in. concrete pavement; (m) alley between Polk, Arthington Sts., Independence Blvd. and Springfield Ave., 280 cu. yds. grading, 800 sq. yds. 8-in. concrete pavement; (n) alley between Fillmore, West 12th, Albany and Whipple Sts., 282 cu. yds. grading, 1,220 sq. yds. 7-in. concrete pavement; (o) alley between Fillmore, West 12th, Albany and Troy Sts., 638 cu. yds. grading, 1,220 sq. yds. 8-in. concrete pavement; (p) alley between Fillmore, Greenshaw Sts., Crawford and Springfield Aves, 125 cu. yds. grading, 1,250 sq. yds. 7-in. concrete pavement; (q) South Hermitage Ave. from West 47th to West 51st Sts., 4,920 ft. concrete curb and gutter, 2,700 cu. yds. grading, 10,060 sq. yds. asphalt on 6-in. concrete base; (r) Kingston Ave. from East 79th St. to Balimore & Ohio R. R. tracks, 1,870 cu. yds. concrete curb and gutter, 2,200 cu. yds. filling, 2,980 sq. yds. asphalt on 6-in. concrete base; (s) Thomas St. from West Grand Ave. to Cincinnati & Northwestern Ry. tracks, 14,000 ft. concrete curb and gutter, 11,000 cu. yds. grading, 21,600 sq. yds. asphalt on 6-in. concrete, 800 ft. 10-in. tile sewer.

Decatur, Ill.—*S. A. Tuttle, for paving with creosoted wooden blocks North and South Park between Water and Franklin, Prairie from Franklin to Broadway, and Franklin from East Main to Cerro Gordo, $80,568.71.

Joliet, Ill.—*R. F. Conway Co., 133 West Washington St., Chicago, Ill., for improving Whitney Ave. from Taylor St. to Knox Pl., about $46,475.

Waukegan, Ill.—*J. Cape & Son, 468 Water St., Racine, Wis., for paving North Ave. from 1st St. to Glen Flora Ave. Board of local improvements, about $35,454.

Greenfield, Ind.—Commissioners of Hancock county on July 26, the Shelby road contract to *D. H. Fatout, Indianapolis, for $12,989, and the Harmening road to *E. G. Gant, Greenfield, Ind., for $17,000.

Sedalia, Mo.—*J. Menefee, for resurfacing 7¼ miles state highway from Grand Ave, Sedalia, to Dresden; asphalt macadam. Pettis county.

Omaha, Neb.—*H. Murphy Constr. Co., 204-6 Karbach Blk., (a) $12,026; (b) $7,829; (c) $13,305, *C. E. Fanning, Omaha, (d) $11,949; (e) $13,675; (f) $15,369 (g) $61,508. *Omaha Structural Steel Bridge Co., 48th and Leavenworth Sts., (h) $12,422. *J. J. Parks Co., (1) $44,709, for paving (a) 1,500 ft. Frederick St.; (b) ¼ mi. Oak St. from Hanscom Blvd. to 34th St., 40 ft. wide, 2,964 sq. yd. asphaltic concrete, 2,964 sq. yd. 6-in. concrete base and 2,307 ft. artificial curb and gutter; (c) 1,800 ft. 34th St., from Arbor to Spring Sts., 40 ft. wide, 5,099 sq. yd. asphaltic concrete, 5,099 sq. yd. 6-in. concrete and 3,950 ft. combination curb and gutter; (d) 1,200 ft. Dorcas St. from 16th to 20th St., 40 ft. wide, 3,517 sq. yd. 3-in. wire-cut brick block, 3,517 sq. yd. 6-in. concrete base and 2,685 ft. combination curb and gutter; (e) 700 ft. Cuming St. from 30th to 32d St., 50 ft. wide, 3,941 sq. yd. vitr. brick block, 3,941 sq. yd. 6-in. concrete base and 1,905 ft. natural stone; (f) ⅝ mi. 24th St. from Spaulding St. to Ames Ave., 40 ft. wide (repaving), 6,924 sq. yd. vitr. brick, 770 sq. yd. 6-in. concrete base (resurface old base) and 664 new and 2,570 ft. reset natural stone curb; (g) 1 mi. Leavenworth St. from 48th to 60th St., 40 ft. wide, 17,975 sq. yd. vertical fiber, 17,975 sq. yd. 6-in. concrete base and 10,110 ft. artificial stone curb and gutter; (h) ¼ mi. Haskell St. from Hanscom Blvd. to 34th St., 40 ft. wide, 3,700 sq. yd. 3-in. wire-cut brick block, 3,700 sq. yd. 6-in. concrete base and 2,791 ft. combination curb and gutter; (i) ⅝ mi. 24th St. from Lake to Spaulding St., 40 ft. wide (repaving), 17,990 sq. yd. vitr. brick block, 2,000 sq. yd. 6-in. concrete base (resurface old base) and 6,354 ft. new and 1,206 ft. reset natural stone.

Bayonne, N. J.—*W. T. S. Crichfield, Greene St., Jersey City, for repairing cuts and broken surface in asphalt and bitulithic pavements; work involves 7,000 sq. yds. asphalt surface; about $25,400.

Hastings, Neb.—*Central Bridge & Construction Co., Wahoo, Neb., and *Capitola Bridge Co., Lincoln, Neb., for the concrete work in Federal aid project No. 7.

Mt. Holly, N. J.—*R. Klockner, Trenton, for paving road in Edgewater Park, about $12,000, by board of freeholders, Burlington county.

Trenton, N. J.—*Ralph Sangiovanni of Newark for constructing the Hammonton-Ancora section of Route 3 in Camden county for 2.77 miles, $143,282. *Black & Klockner of this city for grading and draining the Ancora-Atco section of Route 3, a distance of nearly five miles, for $75,381, by board state highway commission.

Mineola (L. I.), N. Y.—*Booth & Westin of Lawrence for the contract to improve the Farmingdale-Amityville road at $1.15 a sq. yd., by board supervisors Nassau county.

Mineola (L. I.), N. Y.—*Standard Bitulithic Co., for the widening and improvement of Merrick road between Rockville Centre and Lynbrook, warrenite, board of supervisors Nassau county.

New York, N. Y.—*W. J. Fitzgerald, 547 West 45th St., (a) $10,700; (b) $21,424; (c) $12,102. *C. Heibock, 633 Wales Ave., (d) $7,333. *Davney Asphalt Paving Co., 1170 Broadway, (e) $82,786, for regulating and repaving with granite block pavement on concrete foundation (a) Front St. from Coenties Slip to Old Slip; (b) Worth St. from Church to Hudson Sts.; (c) Duane St. from Elm St. to Broadway; (d) 2d Ave. from 59th to 60th St.; (e) Broadway from 169th to 181st St. F. L. Dowling, boro. pres., Manhattan boro.

New York, N. Y.—*W. J. Fitzgerald, 547 West 45th St., (a) $28,222; (b) $16,090; (c) $38,295. *Burnside Paving Co., 270 Burnside Ave., (d) $90,467. *P. J. Kearns Con Contracting Co., 2306 Creston Ave., (e) $18,525. *Davney Asphalt Co., 1170 Broadway, (f) $30,759. *J. L. Busstar, 150th St. and Harlem River, (g) $14,269, for regulating and repaving with granite block pavement on concrete foundation (a) Front Sa. from Fulton to Roosevelt St., curb to rail; (b) Water St. from Whitehall St. to Coenties Slip; (c) Duane St. from Park Row to Centre St.; (d) 2d Ave. from 37th to 45th St.; (e) 15th St. from Ave. A to Ave. B; (f) Lexington Ave. from 42d to 53d St.; (g) regulating and repaving with sheet asphalt on concrete foundation 72d St. from Ave. A to 1st Av. F. L. Dowling, boro. pres., Manhattan boro.

Columbus, O.—*Lee Bros. & Petticord, Clyde, O., for paving the unfinished portion of Columbus pike in Erie county; $104,229.26.

Fremont, O.—*A. G. Witte & Son, Elmore, for paving Elm St., brick on concrete bed with sand filler, about $12,164.

Woodsfield, O.—*W. W. Patton, this city, for grading, curbing and paving with brick in Creamery St., at $3,548.

Harrisburg, Pa.—*Bunce & Carll, Olean, N. Y., at $44,745.85, for Ap. 575-6-7, 6,260 ft. plain concrete, Smethport borough and Keating townships, McKean county. State highway department, August 1.

Harrisburg, Pa.—*Stucker Bros. Const. Co., Harrisburg, Pa., at $87,176.75, for building state highway route 131, 17,795 ft., reinforced concrete, Pennsburg and Kennett townships, Chester county; also state highway route 131, 19,223 ft., reinforced concrete, Aston and Concord townships, Delaware county, at $132,186.25. State highway department, Aug. 1.

Harrisburg, Pa.—*Booth & Flinn, Ltd., Pittsburgh, Pa., Westmoreland county, Ligonier borough, state highway route 119, 5,091 ft., plain concrete, at $89,385.15. State highway department, Aug. 1.

Harrisburg, Pa.—State Highway Department, Aug. 1, received bids for following work: Beaver County, Darlington Township, State Highway Route 204, 5,309 ft. plain concrete—J. G. McGuire Co., Beaver Falls, $71,855.47; G. S. White Co., Pittsburgh, Pa., $74,459.50. Montgomery County, Skippack Township, State Highway Route 270, 2,350 ft. bituminous macadam on a telford base—Wm. C. Evans, Ambler, Pa., $28,851.00. Northampton County, Washington and Lower Mt. Bethel Townships, State Highway Route 165, 28,891 ft. plain concrete—Henry C. Shroeder, Rochester, N. Y., $294,022.10. Somerset County, Somerset Township, State Highway Route 364, 6,675 ft. plain concrete—Frank H. Zeigler, Somerset, Pa., $50,996.50; Keller & Ferner, Somerset, Pa., $60,842.00; Wm. C. Evans, Ambler, Pa., $76,026.50. Elk County, Ridgway Township, State Highway Route 97, 29,667 ft. plain concrete—Henry C. Shroeder, Rochester, N. Y., $254,816.50.

Cooper, Tex.—*General Constr. Co., Farmers & Merchants Bank bldg., Ft. Worth, for paving public square and other streets, involving 16,000 sq. yds. pavement, 3,600 ft. curb and gutter, etc. By city.

Seattle, Wash.—*W. H. Smith, at $1,886, concrete sidewalks Fourth Ave. W., by board of public works.

Spokane, Wash.—See "Sewerage."

Lusk, Wyo.—*Corey & Malcom, Casper, about $10,000, by commissioners Niobrara county, grading and draining 6.7 mi. Hat Creek-Warren Rd., 16 ft. wide. Involves 21,000 cu. yd. grading, 700 ft. corrugated culverts and 55 yds. concrete.

Bagotville, Que.—*Provincial Building & Engineering Co., 83 Craig St. W., Montreal, for roads costing $32,000. Engineers: James, Loudon & Hertzberg, Excelsior Life Bldg., Toronto.

SEWERAGE AND SANITATION

Wichita, Kan.—Ordinances approved authorizing the construction of section A of sub-main sewer No. 20 and for a storm water sewer No. 16. L. W. Clapp, mayor.

Lansing, Mich.—City Engineer instructed to prepare plans for installing a sewer in Kalamazoo St. from Regent St. to west line Lot 37.

Westbury, N. Y.—The commissioners of the Westbury water district will hold a hearing relative to the proposition to appropriate a sum not less than $25,000 for the extension of the system.

Canton, O.—An ordinance was passed authorizing the issuance of $10,000 in bonds to complete payments on the cost of the sewage disposal plant. City Engineer Sarver.

Goldsboro, N. C.—See "Streets and Roads."

South Newburgh, O.—Bids received Aug. 20, Twiney road sewer assessment bonds, $13,086.89. Village Clerk Herman Bohning.

Wellsboro, Pa.—At special election on Aug. 17, voters will decide on issuing $24,000 sewer system bonds.

Seattle, Wash.—See "Streets and Roads."

McAlester, Okla.—See "Water Supply."

Windsor, Ont.—Members of the Essex border utilities commission decided not to accept any of the bids offered for the construction of the eastern section of an intercepting sewer connecting Ford and Walkerville. Instead, will readvertise for bids on what is known as the "cost plus" basis to be recommended by the commission's engineer, Morris Knowles. By this method some $30,000 is expected to be saved to taxpayers.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Millville, Fla.—American Lumber Co., Panama City, Fla., will install sewer system at shipyard site, where town for employees will be established.

Elmhurst, Ill.—L. and J. Scully, $64,507; M. C. Connors, $84,995, both of Chicago, low bidders building sewage disposal plant. Work involves 6,600 ft. 18-in., 325 ft. 15-in. vitrified tile pipe sewer, 172 ft. 18-in. c.-i. pipe, 22 manholes, concrete settling tank, concrete dosing chamber, 8 sand filter beds, 2 sand sludge beds, 1,143 ft. 2-in. galvanized iron water pipe, city.

Laurens, Ia.—*Peter Kruse, for sanitary sewer system. A. D. Claussen, Clerk. Geo. Strickland, Mayor. C. H. Currie, Engineer, Webster City, Ia.

Beverly, Mass.—*J. L. Grady, 18 Summer St., at $44,903, by city, for building sewerage system.

Lansing, Mich.—*John Bray, for the construction of sewer in Main St. from 36 ft. east of Middle St. to 168 ft. west, for $109.57. Mayor, J. W. Ferle.

Lansing, Mich.—*Leo Verlinde & Buysse for the sewer in Elizabeth, Lathrop and Clifford Sts., for $1,545. Mayor, J. W. Ferle.

Argyle, Minn.—*Anola Langdon, Argyle, for sewer. 10,800 ft. 8-in. pipe, 1,850 ft. 10-in. pipe, 4,900 ft. 12-in. pipe, 1,400 ft. 15-in. pipe, 300 ft. 8-in. "Ys." 30 ft. 15-in. "Ys" and 500 ft. 6-in. stoppers, 19,000 lin. ft. excavation and backfilling. E. A. Brekke, Vil. Rec. Village to furnish pipe.

Kings Park, N. Y.—New York Sewage Disposal Co., 37 East 28th St., New York City, at $15,037; P. T. Farley, 103 Park Ave., New York City, $15,290; U. S. Drainage & Irrigation Co., 17 Battery Pl., New York City, $15,790, low bidders for alterations and additions to sewage disposal plant at Kings Park State Hospital. State hospital comn., Capitol, Albany.

Long Island City, N. Y.—A. Terris, 570 Degraw St., Brooklyn, (a) $376,684; J. Terry & Sons, Inc., 97 Louisiana Ave., Canarsie, (a) $392,638, (b) $390,718; J. L. Ligretto & Co., Fresh Pond Rd., Brooklyn, (a) $396,767, (b) $396,767; Ajax Drainage Contg. Co., 60 Herkimer St., Brooklyn (b) $458,834, low bidders for building sewer and appurtenances in (a) Genesee St. from Liberty to North Conduit Aves., (b) storm water sewer in Genesee St. from North Conduit to South Conduit Aves. M. E. Connolly, boro. pres., Queens boro.

Seattle, Wash.—Joe Di Julio Co., $4,442; Fiorito Bros., $4,608.50; W. A. Kupoff, $4,832.50; F. Agostino, $5,075.10; G. Alfonso, $5,240.40, bidders for installing sewers in N. and W. 40th St.

Spokane, Wash.—*James C. Broad, for the construction of a sewer in 19th, from Hatch to Grand, for $7,965, and for curbing and crosswalking Shannon, from Howard to Monroe, for $2,426.65.

Antigo, Wis.—*Christ Larson, Antigo, for 600 ft. 8-in. vitrified sewer on N. Superior St. between Willard Ave. and Mendlik Ave.; 600 ft. 8-in. vitrified sewer on Watson St. between Seventh and Eighth Aves. Engineer, Henry Olk. G. O. Palmiter, City Clk.

Manitowoc, Wis.—*Gray-Robinson Co., for sewer; $6,516. Walter C. Staeffler, Clk.

Walkerville, Ont.—*Merlo, Merlo & Ray, 296 Winderham Rd., for sewers for Town Council. Engineer, O. McKay, Pere Marquette Bldg.

Woodstock, Ont.—*S. Smithers, general contract for tile sewers; about $98,000.

WATER SUPPLY

Florence, Ala.—Mayor M. M. Striplin receiving bids Aug. 15 for water extension bonds, $175,000. Bonds were voted at the election July 22 to extend water works system and enlarge filtration plant.

Waldron, Ark.—For improving water works system town having plans prepared.

Fillmore, Cal.—City will have a municipal water system if the railroad commission agrees to the proposed sale of the domestic system of the Sespe Land and Water System for $15,000.

Wethersfield, Conn.—For furnishing water to district the Wolcott Hill Fire District has voted that district officers make contract with Hartford water commissioners and that estimates be received on cost of installing wood pipe lines; about 16,575 feet would be needed.

Brighton, Colo.—Town sold to J. N. Counter water extension bonds to the amount of $85,000. Wm. W. Dibb, town clerk.

Bunnell, Fla.—Bunnell Ice, Light and Water Co. considers building water tower.

Durham, Fla.—City will vote Aug. 20 on $100,000 bonds for water works improvements. G. W. Woodward, clerk, board aldermen.

Decatur, Ill.—An issue of dam repair bonds, $225,000, has been submitted by the city to the Capitol Issues Committee.

Elmhurst, Ill.—Plans to build distributing system and water mains, about $300,000, E. Hancock, 2047 Ogden Ave., Chicago, Ill., engr.

Herrin, Ill.—For the construction of 100,000-gallon clear well to cost approximately $4,000, was voted by city council.

Panama, Ia.—Citizens will vote on Aug. 12 water works system bonds, $10,000.

Brockton, Mass.—City will install this year 150 service connections and 150 new service meters. Horace Kingman, Supt. Water Dept.

Baltimore, Md.—Water department is considering construction of a building for manufacture and storage of alum.

West Roxbury, Mass.—Improvement of water supply facilities in the district urged by the Germantown citizens association.

Livingston, Mont.—Citizens voted in favor issuing $35,000 bonds for reservoir.

Clatonia, Neb.—$2,000 bond issue voted for water works.

Syracuse, N. Y.—Ordinance passed to purchase motor pump for the bureau of water, to be used in pumping from reservoir to the standpipe and enabling the conduits to empty capacity flow into the reservoir day and night.

Watertown, N. Y.—H. A. Kahler & Co., New York, successful bidders for $50,000 bonds authorized July 18 at special election for development of city water power; $106.48 premium; $3,290. City Treasurer, H. J. Snook.

Watervliet, N. Y.—City voted July 29 for completing the new Normanskill water supply for the city $130,000 for the purchase of a centrifugal pump and dynamo, installing four additional filter units, and defeated the expenditure of $45,000 for the purchase of water meters. Mayor Joslin.

Goldsboro, N. C.—See "Streets and Roads."

Rocky Mount, N. C.—Rocky Mount Mills plan to install 90-ft. stand pipe or 75,000-gal. tank on trestle.

Defiance, O.—Water works bonds to the amount of $17,000 has been sold to the Merchants National Bank of Defiance. Harry R. W. Horn, city auditor.

Fostoria, O.—Construction of a water-softening plant to cost $15,000 will be made here by the Toledo & Ohio Central railroad.

Freeport, O.—Village Clk. Chas. Linard receiving bids Sept. 2 for an issue water works coupon bonds; $13,000.

Lima, O.—Hornblower & Weeks of New York successful bidders for an issue water main refunding bonds, $35,000. Secretary sinking fund trustees.

McAlester, Okla.—City sold to Spitzer, Rorick & Co., of Toledo, and Geo. F. Gilbert, of Okhahoma City, jointly, the following bonds: Water, $630,000; sewer, $108,000. J. M. Gannaway, city clerk.

Klamath Falls, Ore.—During this year will install 2,000 ft. 6-in., 12,000 ft. 4-in. cast-iron pipe and 60 service connections; also 200 new service meters. O. H. Brenneman, assistant division supt., California-Oregon Power Co.

Salem, Ore.—Applications for construction of Traverse Lake reservoir and Echo Lake reservoir, in Baker County, have been approved by State Engineer Lewis. Water is to be stored at head of Eagle Creek and applications are for appropriation of the stored water and the waters of Goose and West Eagle Creek for the irrigation of 2,321 acres of land near Keating. Two small reservoirs, to be constructed, will, it is estimated, cost $7,000 and distribution system about $45,000. Main canal will be about 20 miles long. State Engineer has issued a permit to Big Creek Ditch Co., of Medical Springs, Ore., to appropriate 41.81 second feet of water from Catharine Creek. A supplemental supply for irrigation of 3,345 acres will be supplied. A ditch 4½ miles long will be built at an estimated cost of $8,000.

Bethlehem, Pa.—The properties of the Bethlehem City Water Co. may be purchased by the city.

Sheridan, Pa.—Construction of a filtration plant adjoining its furnace plant considered by the Lavino Furnace Co.

Charleston, S. C.—The War and Navy Departments have agreed to spend $250,000 toward necessary additions to the water supply.

North Augusta, S. C.—City recently voted $50,000 of bonds for constructing water works system; E. G. Smith, 400 Harrison Bldg., Augusta, Ga., engaged as engineer to prepare plans and supervise construction; earth reservoir, filter, pumps, standpipe; mains will be of 6 and 8 ins. principally; source of supply not fully determined. Jas. R. League, Chmn. Board of Public Works.

Orangeburg, S. C.—Will lay about 1,000 ft. 10-in. and 1,200 ft. 6-in. cast-iron pipe during this year. J. Ross Fizer, supt. water and light plant.

Mitchell, S. D.—City will hold an election Aug. 27 to authorize an issue of $100,000 water works improvement bonds. If above issue is authorized a new station building will be built, one large pressure pump and several well pumps will be installed, an additional boiler will be added, a number of mains will be laid and probably a dynamo to furnish electric current for the plant and well pumps will be installed. R. E. Davis, city auditor.

Austin, Tex.—Attorney General approved $25,000 water works bonds for city of Brady.

Blythe, Tex.—Ordinance passed by city council to vote on issuing water system bonds, $35,000.

Galveston, Tex. — See "Streets and Roads."

Alexandria, Va.—Installation of a filtration plant will be made by the Alexandria Water Co.; cost about $60,000; also other improvements will be made.

Petersburg, Va.—To furnish additional water supply to Camp Lee, city plans to improve water works; about $90,000. J. E. Harrek, chairman water comn.

Seattle, Wash.—See "Streets and Roads."

Seattle, Wash.—Ordinance passed providing for improvement of 60th Ave. S. W. from Beach Drive to W. Spokane St., and 61st Ave. S. W. from Beach Drive to W. Hanford St. by water mains, etc.

Seattle, Wash.—Resolution adopted declaring intention of City Council to order improvement of Beacon Ave. from Spokane St. to Hinds St. by the construction of water mains, and setting Aug. 19, 1918, as date for hearing.

Kaslo, B. C.—The Gibson Mining Company, Ltd., will soon build water works, $10,000. C. D. Empfield, secretary-treasurer.

Brantford, Ont.—W. S. Lea, of Montreal, has proposed the installation of a mechanical filtering plant at the water works station.

Fort Francis, Ont.—G. A. Stimson & Co., of Toronto, successful bidders for an issue water works bonds, $6,565.16.

Hamilton, Ont.—City council considering laying water main; cost, $5,000. E. R. Gray, engr.

Montreal South, Que.—For pumping filters and equipment city soon lets contract.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Millvale, Fla.—American Lumber Co., Panama City, Fla., will provide water supply for shipyard employees.

Boyne City, Mich.—*Ayers & Co., Chicago, Ill., for driving more wells at the water works plant to increase water supply.

Wayne, Mich.—*Brooks' Sons Co., Jackson, for laying 12,700 ft. 4-8-in. water main, etc., by village.

Good Thunder, Minn.—*Fairbanks, Morse & Co., Third Ave. and 3rd St. S., St. Paul, Minn., for one adjustable stroke deep well pump, 6x6-in. discharge "T," connected with 220-volt, 3-phase, 60-cycle electric motor with starter, 750-R.P.M. engine with 14-in. pulley. H. C. Mielke, Vil. Rec.

Rich Hill, Mo.—*Merkle Machinery Co., 308 Interstate Bldg., Kansas City, for improving water works and electric light plant, about $11,600, by city.

Livingston, Mont.—*Richard Hoffer, this city, for constructing reinforced concrete reservoir, 1,000,000 gal. capacity, at $27,507.

Thiells, N. Y.—*C. Nally, 710 Columbus Ave., New York City, by L. F. Pilcher, state architect, Albany, for building underground sewer and water connections to Letchworth village, about $35,700; furnishing and installing 4, 6, 8 and 12-in. vitrified tile sewer pipe and 4, 6 and 8-in. c.i. water pipe, 20 manholes and 7 hydrants.

Ashtabula, O.—City Council passed motion authorizing City Manager to enter into contract with Ashtabula Water Supply Co. for extension of 6-in. main to serve needs of Pearce Tire & Rubber Co., which is located at foot of Benefit St.

Quebec, Que.—*Canada Iron Foundries, Ltd., of Redmill, Three Rivers, general contract for construction of water main; $7,000.

LIGHTING AND POWER

Sherborn, Mass.—Plans being prepared for the construction of a large power plant at the Sherborn Reformatory for Women, to cost about $70,000. Mrs. Jessie D. Hodder, supt.

Galway, N. Y.—Plans for the erection of an addition to the power plant at the Saratoga County Homestead Sanitarium, to cost $12,000, is considered by the board of managers.

Rochester, N. Y.—For the immediate construction of a power plant at its works, to provide for increased capacity, the Bridgeford Tool & Machine Works, Winton road north, is considering plans.

Sandusky, O.—Bids have been asked by the county commissioners for the contract to install new electrical fixtures in the court house. The lights will be uniform in style in each office and are to be ornamental.

Madison, S. D.—The Madison water and electric light plant was destroyed by fire, causing an estimated loss of $100,000. A new plant will be built.

Galveston, Tex. — See "Streets and Roads."

Lubbock, Tex.—City council will shortly let contract for the construction of a municipal electric light and power plant. Cost, $35,000.

Seattle, Wash.—City was authorized by Capital Issues Committee to sell $5,500,000 in bonds for construction of hydro-electric plants on Skagit River to serve war industries. Project had been reported adversely by Capital Issues Committee of San Francisco Federal Reserve Bank but was brought before National Committee here on appeal by Mayor Hanson and other Seattle officials. Municipality is permitted to sell $1,500,000 of bonds this calendar year and $1,000,000 every six months thereafter until the entire amount is floated.

Wheeling, W. Va.—The street lighting commission and the Wheeling Commercial Association have planned improvements to the street lighting system.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Rich Hill, Mo.—See "Water Supply."

New York, N. Y.—T. Frederick Jackson, 99 John St., (a) $17,700, (c) $1,000, 75 days; Hixon Electric Co., 246 Sumner St., Boston, Mass., (a) $18,500, (c) $500; United Electric Constr. Co., 101 Park Ave., (a) $22,400, (b) $21,500, (c) $1,000, bidders July 29 for installing electric lighting and power system in shipbuilding slip No. 2, Spec. 3136, (a) net price and time for work complete in accordance with drawings and specifications, (b) net price and time of work complete in accordance with bidder's specifications, which shall conform in general to the government specifications, (c) net reduction in price and time from (a) and (b) if use of best grade of National Electric Code wire and cable is permitted.

McKees Rock, Pa.—*Rose & Fisher, 82 Pennsylvania Ave., Pittsburgh, for the construction of a one-story extension to its power plant at the local works; will be about 40x80 feet; estimated cost, $18,000. By the Pressed Steel Car Company, Farmers Bank building, Pittsburgh.

Washington, Pa.—*Austin Co. of Cleveland, Ohio, by the Electric Reduction Co., for the erection of a two-story machine shop and boiler plants at its works, to cost about $15,000.

FIRE

Fredonia, N. Y.—Citizens will vote Aug. 24 on the following bonds: Fire apparatus, $7,000, and stand pipe, $7,000.

Charleston, W. Va.—Budget committee recommends the purchase by the city of three pieces of property for erection new fire stations.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Battle Creek, Mich.—*C. H. Gillis & Co. for rebuilding of No. 1 fire station.

Dallas, Tex.—American La France Co. only bidder to supply the city with a 105-h. p. tractor for the fire department.

BRIDGES

Chico, Cal.—City trustees have decided as soon as money is available to build a bridge over the Dayton Rd. crossing at 9th St. Plans for a bridge, costing about $5,000, have been tentatively approved.

San Jose, Cal.—Board of supervisors receiving bids soon for the construction of concrete bridges on the Arastradero road and Purissima Ave., and on the Page Mill road over Maladero creek, all in district five.

Marianna, Fla.—Jackson county sold to Powell, Garard & Co., of Chicago, an issue bridge warrants, $30,000.

Elizabeth, N. J.—See "Streets and Roads."

New Brunswick, N. J.—Capital issues committee approved a bond issue of $80,000 to defray the cost of the improvement in the construction of a new electric life drawbridge to replace the present dilapidated span over the Delaware & Raritan canal. County Solicitor Frederick F. Richardson.

Salem, Ore.—Public Service Commission was informed by Regional Director R. H. Aishton that Southern Pacific Co. has been ordered to proceed with construction of overhead crossing at station of Divide in Lane County. This is final word relative to crossing over which there has been considerable controversy between Commission and Southern Pacific.

Ogden, Utah.—Advisability of constructing concrete bridge across Ogden River at Washington Ave. was discussed at City Board meeting.

West Vancouver, B. C.—City council considering erection of a bridge at Marine drive, over the Capilano river; cost, $30,000. Mr. Sharpe, engr.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Ventura, Cal.—Wm. M. Ladbetter & Co., Pacific Electric Bldg., low bidder for constructing Coyote Creek bridge on the Santa Ana road at $17,940.

Ventura, Cal.—*T. E. Hill & Co., 1158 W. 52d St., Los Angeles, for constructing the Lomis culvert, 8x10 ft., about 78 ins. in length, filling and concrete paving of roadway at $3,335.

Fox Lake, Ill.—*J. Keg, Blue Island, about $25,000, for building Nippersink bridge, consisting of one 60-ft. steel span and two 30-ft. concrete spans and substructures; also Pistakee bridge, 50 ft. long, reinforced concrete, and two 2x2 concrete culverts over Fox River.

Kankakee, Ill.—*Devere & Swan, this city, for constructing the Bradley village bridge in Bourbonnais township, Kankakee county, at $648.

Davenport, Ia.—*W. J. Vail, by Board of Supervisors, for filling old span of bridge mile north of city on Brady St. road; $841.

Covington, Ky.—*Jos. Wilbers, Newport, for repairing Covington and Newport Bridge, at $8,772. Mayor, John J. Craig.

Bellmeade, N. J.—*A. L. Carhart, Hale Bldg., Phila, Pa., for building 140-ft. bridge, 50 ft. wide, involving 2,000 cu. yd. concrete and 9 tons steel, about $50,000.

Lisbon, O.—*N. R. Porterfield, Salem, for building reinforced concrete bridge on Cox Highway, between two counties, about $14,000, Columbiana county, Lisbon, and Mahoning county, Youngstown.

The Dalles, Ore.—*Hedges & Huls, this city, for constructing reinforced concrete bridge across Tygh Creek at Tygh Valley at approximately $4,000.

Allentown, Pa.—*Butz & Clader, Allentown, Pa., for furnishing material and constructing wing wall and abutments for same necessary for rebuilding bridge over the Ontelaunee Creek, near Lynnport, at $23,000.

Harrisburg, Pa.—Vincenzo Digiarno, Fayette City, Pa., at $4,717.90, bidder Fayette County bridge in Washington Township, State Highway Route 247; State Highway Dept., Aug. 1.

Philadelphia, Pa.—*W. A. Murdy, 228 South Adler St., for building new centers to approach of Passyunk Ave. bridge, 200 piles to be driven, 65 ft. long, 18,000 ft. lumber to be used, about $22,500.

Bronte, Ont.—*E. C. Levis, St. James' Chambers, Toronto, general contract for $25,000 bridge for Toronto and Hamilton Highway Commission.

MISCELLANEOUS

Whittier, Cal.—City plans for the construction of a new municipal hospital in the near future.

Washington, D. C.—The Department of Labor authorizes the following: Fourteen dormitories, together with a mess hall and kitchen, constitute the first portion of the housing development to be undertaken by the Bureau of Industrial Housing and Transportation at the Washington Navy Yard. Plans have been completed and bids requested for the construction of these buildings, which are designed to accommodate about 500 navy yard workers. In addition to the foregoing it is proposed to erect 14 apartment buildings and 300 houses to meet the needs of navy yard workers and their families. Plans for these structures are also well under way and it is hoped that actual construction will begin within the next few weeks.

Washington, D. C. (Bureau of Foreign and Domestic Commerce, Department of Commerce).—A man from Costa Rica, who is at present in the United States, desires to secure an agency, on a commission basis, for the sale of electrical goods, steel pipes, galvanized iron, agricultural implements, automobiles and accessories, railway material, machinery, cement, porcelain. Payment will be made by cash by New York commission house. References. Correspondence may be in English . Refer to Opportunity No. 27220.

Orlando, Fla.—City will build two incinerators. The Mayor.

Winder, Ga.—No bids were received July 8 by comrs. of Barbury Creek drainage district., H. S. Millsaps, chairman, for constructing about 12½ miles of dredge ditches, suitable for dredge on 12-ft. or 14-ft. hull, 195,000 cu. yds. excavation. Will D. Alexander, engr., 412 N. Graham St., Charlotte, N. C. Bids are still being received for this work.

West Point, Ky.—Construction division, war department, Washington, plans base hospital, about $60,000, plus percentage.

Detroit, Mich. — The department of health will soon recommend the purchase of the site to the council of about

500 acres three miles west of Northville in the northwest corner of Wayne county, which was inspected by city officials as the site on which the department of health proposes to build the municipal tuberculosis sanatorium. A request for permission to issue $350,000 in bonds to pay for the site and erect temporary buildings is now before the federal capital issues committee. Decision is expected shortly. Dr. James W. Inches, health commissioner.

Detroit, Mich.—City has been granted permission by Capital Issues Committee at Washington to issue bonds for building of tuberculosis sanitarium at cost of $350,000. Department of Health has option on site near Northville. Tentative plans have been prepared.

Meridian, Miss.—An ordinance proposing a bond issue of $98,000 has been prepared and is ready to be introduced into the city council. However, pending the report of Charles Behre, food administration surveyor for this state and Louisiana, of conditions in this city recently investigated, the city council have not acted on the matter. Sentiment for a municipal ice plant is beginning to form among the people of this city and the Central Trades Council has already endorsed it. J. M. Dabney, Mayor.

Camden, N. J.—See "Water Supply."

Cape May, N. J.—Bureau Yards and Docks, Navy Dept., Wash., D. C., plans to install foundry equipment at Naval Hospital; spec. 3241; about $10,000.

Elizabeth, N. J.—See "Streets and Roads."

Lawrenceville, N. J.—Construction division, war department, Washington, D. C., plans convalescent hospital, about $40,000, plus percentage.

Catskill, N. Y.—Town will soon let contract for 7 voting machines; cost about $5,200.

New York City, N. Y.—The following notes, aggregating $15,000,000, at 4.235 per cent.: Revenue bills, 131 days, $10,000,000 dated July 29, 1918, due Dec. 10, 1918; revenue bills, 124 days, $5,000,000, dated Dec. 3, 1918, were sold to Salomon Bros. & Hutzler of New York. Arthur J. Philbin, deputy city comptroller.

Pleasantville, N. Y.—Village will receive bids Aug. 12 on land purchase bonds, $6,000. Chas. J. Laire, clerk.

Yonkers, N. Y.—City sold the following bonds to Redmond & Co. and Harris Forbes & Co. of New York, jointly: Deficiency 1917 revenue, $475,000; public building, $22,000; school, $365,000. James J. Lynch, city comptroller.

Cleveland, O.—The city sinking fund has purchased the $8,000 park bonds, and the school sinking fund the $30,000 hospital bonds. C. J. Neal, director of finance.

Youngstown, O.—The Carnegie Steel Co. has announced plans for the expenditure of $250,000 in this city in a housing project for the benefit of employes.

Portland, Ore.—City Auditor George R. Funk receiving bids Aug. 14 for $500,000 of assessment collection bonds.

Erie, Pa.—City may shortly have a new municipal hospital in Glenwood Park if plans of the health board materialize.

Salt Lake City, Utah—Redmond & Co., of New York, were the successful bidders for an issue $350,000 refunding bonds.

Rush Bluff, Va.—Bureau yards and docks, navy department, Washington, D. C., receiving bids fuel oil pipe line (spec. 3256), about $25,000.

Pudget Sound, Wash.—Puget Sound Navy Yard will receive bids for repairs to various buildings, Specification 3,260.

Seattle, Wash.—The Port of Seattle commission sanctioned the proposal of submitting to the election Sept. 1 a proposition for $2,500,000 for the immediate duplication of the Smith Cove and Hanford St. terminals, which would add two more monster piers to Seattle waterfront facilities.

Spokane, Wash.—The State Public Service Commission had a hearing with county commissioners relative to establishing a grade crossing over the tracks of the O.-W. R. & N. railroad one and a half miles south of Dishman. The crossing would connect a new road on the west side of the track with the Mansfield road on the east side, which is the main thoroughfare leading into the city from the southeast. Definite action was deferred.

Spokane, Wash.—City council passed the ordinance appropriating $5,000 for the proposed municipal market, which Commissioner Fleming is advocating and preparing plans.

Oak Creek, Wis.—No bids were received July 18, by L. H. Goelzer, town clerk of Oak Creek, Oakwood, Wis., for excavating a ditch in Sec. 13, 14 ft. wide at top and 4 ft. wide at bottom, involving 16,753 cu. yds. Will be readvertised.

BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

Washington, D. C.—*Cauldwell Wingate Co., 381 Fourth Ave., New York City, for the construction of apartments and houses at Bridgeport, Conn., which will provide accommodations for 600 families. The Bureau of Industrial Housing and Transportation, the Department of Labor.

Clinton, Ia.—*Fred Bodenhofer, Lyons, Ia., for culverts. Fred Lohberg, Co. Aud.

Marion, Ia.—*Perry Jayne, Cedar Rapids, for culverts; $9,625.

Rockwell City, Ia.—*Cem Tile Products Co., Sac City, for Drainage Ditch No. 228 in Williams and Garfield Townships; $3,050. Labor, S. M. Grant, $1,650; R. B. Dixon, Co. Aud., Calhoun County.

Boston, Mass.—*Bianco & Parenti for building catch-basins, manholes and drains various streets in city proper and South Boston; $4,445.75.

Duluth, Minn.—*Oscar Akerstrom and *Axel Carlson, Duluth, for side ditches on Birch Rd. near Duluth; $480.

Duluth, Minn.—*W. C. Sargent, 102 Providence Bldg., Duluth, for County Ditch No. 7; $2,963.

Albany, N. Y.—*Bronx & Kimmey, Hudson Falls, at about $77,895, for building concrete capped timber guide cribs near Locks Nos. 3, 5 and 6, Champlain Canal, No. 168. W. W. Wotherspoon, Supt. Public Works.

Fort Jay, N. Y.—*Merritt & Chapman Derrick & Dredging Co., 17 Battery place, New York City, about $60,000, for construction submarine pipe line. Construction Division, War Dept., Wash., D. C.

New York, N. Y.—Almiral & Co., 1 Dominick St., $37,079, 100 days; Gillis & Geohegan, 537 West Broadway, $36,000, 100 days, bidders, installing piping system in structural shop, Spec. 3157, work complete. Bureau Yards & Docks, Navy Dept., Wash. D. C.

Halifax, N. S.—*W. Lownes, 81 Cobourg road, for repairing city hall; $11,000. City council.

Yankton, S. D.—*S. L. Briggs Co., Omaha, Neb., for constructing Yankton-Clay County drainage ditch, at $1.38 per cu. yd.

Galveston, Tex.—*H. J. Hetkes for the construction of the extension to the storm drain at Twenty-seventh St. and the waterfront, at $3,070.25. City Engineer Willits.

TOO LATE FOR CLASSIFICATION

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS.	
Tex.,	Houston	2 p.m., Aug. 10	Grading and paving with sheet asphalt, asphaltic concrete, bitulithic Uvalde rock asphalt or vertical fibre brick	E. E. Sands, City Engr.
Mass.,	Boston	noon, Aug. 12	Paving with sheet asphalt, Topeka, bitulithic or filbertine	Thos. F. Sullivan, Comsr. of Pub. Wks.
Ill.,	Decatur	10 a.m., Aug. 15	Grading, draining, curbing and paving with brick	Jerome J. Heger, City Clk.
Pa.,	Harrisburg	10 a.m., Aug. 30	Reconstruction of following pavements: 5,309 ft. one-course plain concrete, Beaver Co.; 12,173 ft. water-bound macadam on telford foundation, Bedford Co.; 20,482 ft. one-course plain concrete, Berks Co.; 5,443 ft. vitrified block, Blair Co.; 5,745 ft. bituminous concrete on concrete foundation, Delaware Co.; 4,566 ft. vitrified block on concrete foundation, Elk Co.; 10,560 ft. one-course plain concrete and 15,918 ft. one-course plain concrete or bituminous concrete on concrete foundation, Erie Co.; 18,920 ft. one-course plain concrete, Mercer Co.; 7,824 ft. one-course plain concrete, Tioga Co.; 3,319 ft. grading and drainage, Washington Co.	J. Denny O'Neil, State Highway Commissioner.
Tenn.,	Nashville	Sept. 2	Road construction on three sections, 2½, 12½ and 11 miles in Franklin, Bedford, Moore and Greene counties, to cost about $250,000	A. M. Nelson, State Highway Engineer.
			SEWERAGE.	
Mass.,	Boston	noon, Aug. 14	Constructing sewerage works	Thos. F. Sullivan.
			BRIDGES.	
Mass.,	Boston	noon, Aug. 12	Planking and paving floor of bridge between Boston and Cambridge	Room 511, City Hall Annex.
Cal.,	San Jose	11 a.m., Aug. 19	Constructing reinforced concrete bridge	Henry A. Pfister, Co. Clk.
Pa.,	Harrisburg	10 a.m., Aug. 30	Constructing bridge, 28 ft. clear span	J. Denny O'Neil, State Highway Commissioner.
			MISCELLANEOUS.	
Md.,	Baltimore	Aug. 15	Constructing retaining wall and improvements to storehouse at lighthouse reservation, Chincotague, Va.	Lighthouse Inspector, Baltimore, Md.
Tenn.,	Memphis	Aug. 19	Constructing about 112,000 cu. yds. earth work in lower St. Francis levee district	Mississippi River Com., Custom House, Memphis, Tenn.

APPROVAL

HERSEY DETECTOR METER

The Hersey Detector Meter has been accepted for thirteen years in 3", 4", 6", 8", 10" and 12" sizes without any restrictions or conditions of any kind by every Insurance Company, Stock and Mutual, doing business in the United States, and by the Water Departments and Water Companies in more than 600 Cities and Towns for use on over 4,000 Fire Services protecting over $2,000,000,000. worth of Insured Property.

HERSEY MANUFACTURING COMPANY

BOSTON NEW YORK CHICAGO COLUMBUS, O

PHILADELPHIA ATLANTA SAN FRANCISCO

Books on Water Purification

Elements of Water Bacteriology.

By S. C. Prescott and C. E. A. Winslow.

Is in its third edition. Contains about 270 pages, and while it pretends to deal with only the elements of the subject, these elements are treated in a thoroughly scientific manner by experts on the subject. Price, $1.75.

The Value of Pure Water.

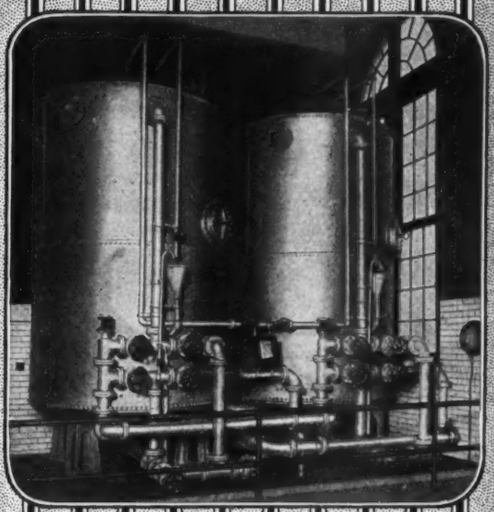
By George C. Whipple, of Harvard University.

The purpose of this book is to illustrate the fact that impure water affects not only the health and comfort of a community, but also the pocketbooks of the people. It contains 80 pages and sells at $1.00.

ORDER FROM

MUNICIPAL JOURNAL

243 West 39th St., New York



NOW Is the Time To Prepare For Next Winter's Shortage of Fuel and Labor

There's no reason to believe that fuel and labor conditions next winter will be improved. FIX THINGS NOW to meet these conditions. Scale in your boilers runs up your fuel consumption and demands more labor. Keep your boilers free from scale. You'll use 10% to 20% less coal. Your clean boilers will carry bigger overloads. Your reserve units can be used all the time. You'll save the labor and expense of boiler cleaning.

RIGHT NOW is the time to install "PERMUTIT." It will ABSOLUTELY PREVENT SCALE—thereby giving you all the advantages named above. It is NOT a "compound" or a "cleaner" or a "treatment"—but a simple filter that removes all encrusting salts from the feed water BEFORE IT ENTERS THE BOILER. It's as logical a part of your equipment as a feed water heater—and effects far greater savings.

We can make prompt deliveries of "Permutit." Tell us your conditions. Get prepared—now.

The Permutit Company

440 Fourth Ave., New York

"Performance, Not Promise"

Permutit TRADE MARK REG. U.S. PAT. OFF.

The Feed Water Softening Filter to Zero Hardness

OFFICIAL ADVERTISING

"Reaches Most Bidders at the Least Cost"

Rate, $2.00 an inch an insertion

Why pay 50 to 80 per cent. more in other papers? Our results are BETTER. Copy reaching us by 10 A. M. Thursday will go in issue mailed the next day.

Bids received until August 12, 1918.

Highway Work

ALBANY, N. Y.

OFFICE OF THE STATE COMMISSION OF HIGHWAYS, ALBANY, N. Y.—Sealed proposals will be received by the undersigned at their office, No. 55 Lancaster Street, Albany, N. Y., at one o'clock P. M. on Monday, the 12th day of August, 1918, for the completion of the following highways:

CATTARAUGUS—Two highways, 6.88 and 4.73 miles.

DUTCHESS—One highway, 6.81 miles.

ERIE—Three highways, 6.03, 9.14 and 5.19 miles.

GREENE—One highway, 3.98 miles.

MONROE—One highway, 2.92 miles.

MONTGOMERY—One highway, timber crib.

NASSAU—Three highways, 5.24, 3.09 and 3.38 miles.

ONTARIO—One highway, 8.63 miles.

ORANGE—One highway, 9.18 miles.

SCHENECTADY—One highway, 6.33 miles.

WESTCHESTER—One highway, 4.29 miles.

and also for the completion of the following repair contracts:

DELAWARE—One contract, resurfacing.

ONONDAGA—One contract, resurfacing.

and also for the repair of the following highways:

CATTARAUGUS—One contract, resurfacing.

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the office of the Commission in Albany, N. Y., and also at the office of the division engineers in whose divisions the roads to be completed are located. The addresses of the division engineers and the counties of which they are in charge will be furnished upon request.

The especial attention of bidders is called to "General Information for Bidders" on the itemized proposal, specifications and contract agreement.

EDWIN DUFFEY, Commissioner.

I. J. MORRIS, Secretary.

Bids received until August 13, 1918.

Hauling, Excavating and Laying Steel Pipe

JERSEY CITY, N. J.

Sealed proposals will be received by the Board of Commissioners of Jersey City, N. J.,

TUESDAY, AUGUST 13, 1918,

at 2:00 P. M., in the Assembly Chamber, City Hall, Jersey City,

FOR HAULING, EXCAVATING AND LAYING 34,590 FEET OF 72-INCH RIVETED STEEL PIPE AND APPURTENANCES FOR JERSEY CITY, N. J., in accordance with plans and specifications on file in the office of the City Clerk, City Hall, Jersey City, N. J.

Blank forms of bid showing estimates of quantities and agreements of sureties must be obtained in the office of the Director of Streets and Public Improvements, City Hall, Jersey City, N. J., or Clyde Potts, Consulting Engineer, 30 Church Street, New York City.

Proposals must be enclosed in sealed envelopes, endorsed "Proposal for Hauling, Excavating and Laying Steel Pipe," directed to this Board, and handed to the City Clerk in open meeting when called for in the order of business relating to sealed proposals.

The bonds required to be furnished on proposals (and a possible subsequent contract) are those of some surety company authorized to do business in the State of New Jersey, or a certified check will be accepted in lieu of bond. All bonds must comply with the provisions of Chapter 75, Laws of New Jersey, 1918.

The Board reserves the right to reject any or all proposals if it is considered for the best interests of the City so to do.

BY ORDER OF THE BOARD OF COMMISSIONERS OF JERSEY CITY, N. J.

DANIEL O'REGAN,
Acting City Clerk.

Dated City Clerk's Office, Jersey City, N. J., July 31, 1918.

Bids received until August 13, 1918.

Notice to Steel Pipe Contractors

JERSEY CITY, N. J.

Sealed proposals will be received by the Board of Commissioners of Jersey City, N. J.,

TUESDAY, AUGUST 13, 1918,

at 2:00 P. M., in the Assembly Chamber, City Hall, Jersey City, N. J.,

FOR FURNISHING AND DELIVERING 34,590 LINEAL FEET OF 72-INCH RIVETED STEEL PIPE FOR USE BY JERSEY CITY, N. J.,

in accordance with plans and specifications on file in the office of the City Clerk, City Hall, Jersey City, N. J.

Blank forms of bid showing estimates of quantities and agreements of sureties must be obtained in the office of the Director of Streets and Public Improvements, City Hall, Jersey City, N. J., or Clyde Potts, Consulting Engineer, 30 Church Street, New York City.

Proposals must be enclosed in sealed envelopes, endorsed "Proposal for 72-Inch Riveted Steel Pipe," directed to this Board and handed to the City Clerk in open meeting when called for in the order of business relating to sealed proposals.

The bonds required to be furnished on proposals (and a possible subsequent contract) are those of some surety company authorized to do business in the State of New Jersey, or a certified check will be accepted in lieu of bond. All bonds must comply with the provisions of Chapter 75, Laws of New Jersey, 1918.

The Board reserves the right to reject any or all proposals if it is considered for the best interests of the City so to do.

BY ORDER OF THE BOARD OF COMMISSIONERS OF JERSEY CITY, N. J.

DANIEL O'REGAN,
Acting City Clerk.

Dated City Clerk's Office, Jersey City, N. J., July 31, 1918.

Bids received until August 28, 1918.

STATE OF NEW JERSEY

State Highway Commission

Notice is hereby given that sealed bids will be received by the State Highway Commission of New Jersey for the improvement of the following:

State Highway Route No. 2 (Burlington-Roebling Section), concrete surface, estimated 52,800 square yards, Burlington County.

Bids will be opened and read in public at the office of the State Highway Commission, Broad Street Bank Building, Trenton, N. J., on Wednesday, August 28, 1918, at 10:30 A. M.

Each bidder must accompany his bid with a certificate from a surety company, duly authorized to do business in this State, stating that such surety company will provide said bidder with a bond in such sum as is required in, and in accordance with, the provisions of said specifications, conditioned for the faithful performance of the provisions of the contract and specifications.

By order of the State Highway Commission.

A. LEE GROVER, Chief Clerk.

Bids received until August 30, 1918.

Road and Bridge Constructions

Pennsylvania State Highway Department, Harrisburg, Pa.—Sealed proposals will be received at said office until 10:00 A. M., August 30, 1918, when bids will be publicly opened and scheduled and contracts awarded as soon thereafter as possible for the reconstruction of the following pavements: 5,309 lineal feet of One Course Plain Cement Concrete in Beaver County; 12,173 feet of Waterbound Macadam on a Telford Foundation in Bedford County; 20,482 feet of One Course Plain Cement Concrete in Berks County; 5,443 feet of Vitrified Block in Blair County; 5,745 feet of Bituminous Concrete on a Concrete Foundation in Delaware County; 4,566 feet of Vitrified Block on a Cement Concrete Foundation in Elk County; 10,560 feet of One Course Plain Cement Concrete and 15,918 feet of either One Course Plain Cement Concrete or Bituminous Concrete on a Concrete Foundation in Erie County; 18,920 feet of One Course Plain Cement Concrete in Lehigh County; 10,031 feet of One Course Plain Cement Concrete in Mercer County; 7,824 feet of One Course Plain Cement Concrete in Tioga County; 3,319 feet of Grading and Drainage in Washington County, and for the construction of a bridge in Montgomery County, 28 feet clear span, 45 degrees askew and 9½ feet clear height. Bidding blanks and specifications may be obtained free and plans upon payment of $2.50 per set, except for the bridge, which plans are issued free, upon application to State Highway Department, Harrisburg. No refund for plans returned. They can also be seen at office of State Highway Department, Harrisburg; 1001 Chestnut Street, Philadelphia, and 904 Hartje Building, Pittsburgh, Pa. J. D. O'NEIL, State Highway Commissioner.

EQUIPMENT BARGAINS

HOISTING ENGINES

	Price
1—6¼x10 American DCDD, with boiler	$1,000
1—7x10 Lidgerwood DCDD, with boiler	1,100
1—7x10 Lambert, 3 drum, with boiler	1,600
1—8x12 Mundy DCDD, with boiler	1,300
1—9x10 Lidgerwood, 3 drum, 32″ drums, without boiler	1,900
With boiler	2,300
1—5x8 DCDD Reversible O&S, with vertical engine, without boiler	350
With boiler	550
1—7x10 Lambert DCDD, with boiler	1,100

COMPRESSORS

	Price
1—12x12 Laidlaw-Dunn-Gordon, belt driven, capacity 300′	$750
1—12x12x16 Ingersoll, straight line, steam driven, capacity about 300′ at 80 to 100 lbs.	600
1—Sullivan, 2 stage air, simple steam, capacity 1800′ at 80 to 100 lbs	2,500
2—14x12 Bury Duplex, belt driven, capacity about 550′ at 60 to 80 lbs., each	1,000
1—14x16x10x16 Sullivan, 2 stage air, simple steam, capacity 600′ at 80 to 100 lbs	1,500
1—14x9x10 Bury, 2 stage, belt driven, capacity 350′	1,500
1—Ingersoll-Rand Imperial Type XB2, 500′	2,000

DRAGLINES

	Price
1—Monighan-Walker steam machine, with 50′ boom, 1½ yd. bucket, almost new	$7,000
1—Flory outfit engine 10x12 heavy dragline type boiler, firebox 150 lb. pressure; boom, 60′; steel bucket, 2 yd.; new, 1917	9,000
1—24 Bucyrus, with 85′ boom	

Machinery Warehouse & Sales Co.
791 Old Colony Bldg., Chicago, Illinois

Rates

Equipment Ads
1 inch—$2.50
4 inches—$2.40 an inch
8 inches— 2.30 an inch
15 inches— 2.20 an inch
30 inches— 2.10 an inch
98 inches— 2.00 an inch

Proposal Ads
$2.00 an inch an insertion

Air Compressors

New and used Belt and Steam Driven Ingersoll-Rand Air Compressors from 50 to 400 cu. ft. capacity.

Immediate delivery from Indianapolis stock

HARRIS AIR PUMP CO.
Indianapolis, Ind.

FOR SALE:

Sluice Gates — New Chapman Sluice Gates, 2—60″ x 60″ bronze mounted, rectangular, rising spindle, complete, with floor stands, Fig. 476, Page 208, List 89, Catalog No. 32, Chapman Valve Co.

Suction Hose — 25 ft. New Suction Hose, diameter 20″, tube walls 3/16″, Corrugated, Steel spiral wrapped, ⅝″ diameter, 2½″ pitch.

C. I. Pipe — Miscellaneous lot of 24″ and 36″ Cast Iron Pipe.

T. R. Harber, Purch. Agt., Kansas City Lt. & Pr. Co.
KANSAS CITY, MO.

FIRST—Get Bulletin 237—or, Wire
ZELNICKER in ST. LOUIS
Before buying or selling
RAILS
Locomotives, Cars, Tanks, Machinery, Piling, Etc.
What have you for sale?

STREETS AND ROADS.

Chico, Cal.—County Engineer M. C. Polk is advertising for bids on the construction of a road to be built in the Durham Land colony. Among the 11 bridges that are to be built in the near future, a small bridge over Angel slough and a large bridge across the Feather river at the foot of Bird street in Oroville are included.

Atlanta, Ga.—Preliminary arrangements are being made for paving and widening portion of Luckie street at estimated cost of $28,492; asphalt will be laid on present Belgian block paving, Fulton county and Georgia Railway and Power Co. Chief of Construction.

Bloomington, Ind.—No bids were received for an offering of $4,500 of Monroe county road bonds, Deputy Treasurer Frank Headley reports.

Shreveport, La.—The proposed improvements on the Greenwood road to connect with the parish highway at the State Fair Grounds will probably be put before the Caddo Parish Police Jury, following action taken at a meeting of the board of directors of the Shreveport Chamber of Commerce.

Helena, Mont.—Federal approval only is required before work will be commenced on the construction, under the supervision of the state highway commission, of five federal aid projects in the eastern part of the state. These projects involve the improvement of a total of 25 miles of road at an estimated cost of $89,581. Their length, estimated cost and the nature of the improvement are as follows: Black and White trail in Carbon county, near Bear creek, two and eight-tenths miles long; estimated cost, $18,012. Heavy side-hill grading, installation of concrete culverts and surfacing with gravel 10 feet wide. Billings-Cody way, near Silesia, Carbon county, three and seven-tenths miles long; estimated cost, $21,983. Grading, construction of large drainage canal, installation of two concrete bridges and several concrete culverts and surfacing with gravel 16 feet wide. Big Horn road in Big Horn county, two miles long; estimated cost, $10,236. One section 1,100 feet long which is inundated every spring, requires special construction. Grading and surfacing with gravel 18 feet wide. Red Trail, east of Glendive, nine miles long; estimated cost, $19,425. Grading, installation of culverts and graveling surface nine feet wide. Red Trail, west of Glendive, seven and a half miles long; estimated cost, $19,945. Improvements same as Red Trail east of Glendive. All of these projects are on roads that have been designated as state highways and are the main arteries of travel.

Canton, O.—Ordinances approved to proceed with the improvement of 3d St. S. E. (formerly E. 8th St.) from Market Ave. to Cherry Ave. S. E., and of 4th St. S. E. (formerly E. 9th St.) from Market Ave. to Cherry Ave. S. E., by grading, curbing, draining and paving with vitrified brick on a gravel foundation. C. E. Poorman, mayor.

Canton, O.—City council approved ordinance to establish the grade of Lacave pl. N. W. from McGregor Ave. N. W. to Gilmore Ave. N. W. W. Edgar Jackson, clerk.

East Liverpool.—No bids were presented for the city's $4,000 issue of 5 per cent. street improvement bonds.

Harrisburg, Pa.—State Highway Commissioner J. Denny O'Neil has certified for payment to eligible second-class townships in Allegheny county sums totaling $15,094.74, which will be paid to them during the year as cash road tax bonus. This money will be at the disposal of the supervisors for the improvement of township roads and bridges, providing the plans meet with the approval of the bureau of township highways of the state highway department. Allegheny county has approximately 1,875.36 miles of township roads: Aleppo (Glenfield), Bethel (Bridgeville, No. 1), Elizabeth (Blythedale), Fawn (Tarentum, No. 2), Findley (Coraopolis), Forward (Monongahela, No. 1), Franklin (Sewickley, No. 2), Hampton, Allison Park), Indiana (Glenshaw, No. 1), Kilbuck (99 Meadow Ave., Emsworth), Kennedy (McKees Rocks), Lincoln (McKeesport), Marshall (Wexford, R. D.), Moon (Coraopolis), Neville (Neville Island, Coraopolis, No. 1), North Fayette (Oakdale), O'Hara (Sharpsburg) Patton (Braddock Natl. Bank, Braddock), Pine (Wexford, R. D.), Richland (Bakerstown), Robinson (McKees Rocks), Ross (Pittsburgh), Sewickley (Sewickley), Snowden (Broughton), Sewickley Hghts. (Sewickley), Upper St. Clair (Bridgeville), Versailles (Union Natl. Bank, McKeesport), West Deer (Gibsonia, No. 3). The second-class townships in Beaver county will receive $11,702.60: Big Beaver (New Galilee), Brighton (Beaver), Chippewa (Beaver Falls, R. D.), Daugherty (New Brighton, R. D.), Economy (Sewickley, No. 3), Franklin (Tombell), Greene (Hookstown), Hanover (Hookstown, No. 1), Hopewell (Woodlawn), Independence (New Sheffield, No. 1), Industry (Beaver, No. 1), Moon (Monaca), North Sewickley (Beaver Falls, No. 3), Ohio (Beaver, First Natl. Bank), Patterson (Beaver Falls), Pulaski (New Brighton), Raccoon (New Sheffield), South Beaver (Beaver Falls), Center (Monaca).

Harrisburg, Pa.—State Highway Commissioner J. Denny O'Neil has certified for payment to eligible second-class townships in Washington county sums totaling $26,961.71, as cash road tax bonus. This money will be at the disposal of the supervisors for the improvement of township roads and bridges, providing the plans meet with the approval of the bureau of township highways of the state highway department: Allen (Allenport), Amwell (Washington, No. 5), Blaine (Taylorstown, No. 1), Canton (Washington), Carroll (Monongahela, No. 3), Cecil (Cecil), Chartiers (Houston), Cross Creek (Avella), Donegal (Claysville), East Finley (West Finley, R. D.), Fallowfield (Speers, No. 1), Hanover (Florence), Hopewell (Washington, No. 8), Independence (Avella, No. 2), Jefferson (Hanlin Station), Morris (Dunns Station, No. 3), Mt. Pleasant (Hickory), North Franklin (East Washington), North Strabane (Canonsburg), Nottingham (Venetia), Peters (Canonsburg), Robinson (McDonold, No. 1), Smith (Burgettstown), Somerset (Eighty-four), South Franklin (Washington), South Strabane (Washington), Union (Finleyville, No. 1), West Bethlehem (Scenery Hill), West Finley (Claysville, No. 1), West Pike Run (Bentleyville).

WATER WORKS EQUIPMENT

ABSOLUTE RELIABILITY AND OPERATING ECONOMY ARE THE MOST ESSENTIAL REQUIREMENTS OF

PUMPING ENGINES

The great number of Allis-Chalmers Pumping Engines in continuous service, 365 days a year, demonstrates their reliability.

Official duty tests and published annual reports of station operating costs prove their HIGH ECONOMY.

Is There Any Municipal Problem of Greater Importance Than the Water Supply of a City?

Allis-Chalmers Manufacturing Company

Pumping Engine Department, Milwaukee, Wis.

For all Canadian business refer to Canadian Allis-Chalmers, Limited, Toronto, Ont.

FOREIGN REPRESENTATIVES:

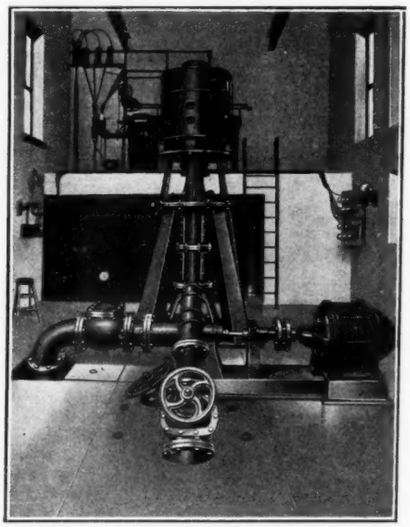
Frank R. Perrot, 883 Hay Street, Perth, W. A.
Frank R. Perrot, 204 Clarence Street, Sydney, N. S. W.
H. I. Keen, 732 Salisbury House, London Wall, E. C., England
W. R. Judson, Huerfanos 1157, Casilla 2653, Santiago, Chile

"Turnkey Jobs"

Our Service is **Complete**, as our organization includes Engineers, Field Construction Forces and Factory Facilities which **puts the burden of getting results on us**—Hence the Guarantee

"Water, or No Pay"

We Write It in the Contract



Write today for Information and Free Literature.

Layne & Bowler Company

"World's Largest Water Developers."

759 Randolph Building
Memphis, Tenn.

SERVICE AND FIRE PROTECTION

Layne Deep Well Turbine Pump ordinarily operating against service pressure by-passing horizontal Turbine. Horizontal Turbine is cut in for fire pressure.

MICHIGAN PRODUCTS

Fire Hydrants	Shear Valves
Gate Valves	Tide Valves
Sluice Gates	Sleeve Valves
Check Valves	Indicator Posts
Foot Valves	Valve Boxes

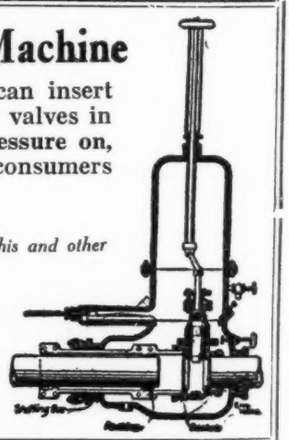
Flower-Stephens Manufacturing Co.
105 Parkinson St., Detroit, Mich.

Valve Inserting Machine

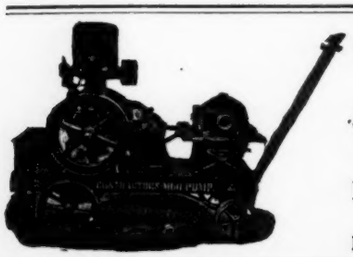
With this machine you can insert new and cut out defective valves in water mains with full pressure on, avoiding annoyance to consumers and increased fire risks.

Write for complete description of this and other water works specialties.

See Sweet's Catalogue, Engineering Edition, for Details and Particulars.



THE A. P. SMITH MFG. CO.
EAST ORANGE, N. J.



90% Saving in Pump Operating Cost if youuse The Parker Contractor's Mud Pump

It has double the capacity of the hand-power pump and can be operated at one-tenth the cost. It will raise and force from 6000 to 8000 gallons of water per hour on less than one quart of gasoline. The truck is solid, is easily transported around the job.

Let us tell you more in our Booklet.

A. A. PARKER, Waterford, N. Y., Sole Manufacturer
NEW ENGLAND AGENTS: Perrin, Seamans & Co., 57 Oliver Street, Boston, Mass.

GLAUBER CLEVELAND

The Only

BRASS GOODS

Guaranteed for Five Years

MANY municipalities have reasoned out that it is cheaper to install Glauber Brass than to be continually ripping up pavements, etc. All **GLAUBER BRASS GOODS** possess ample reserve strength —each piece is tested under 200 pounds hydraulic pressure.

All Glauber products are sold under a **FIVE YEAR GUARANTEE,** such as is not given with any other brass goods on the market. This guarantee is possible only because of the rich bronze metal we use, the sound mechanical principles on which our goods are built, and the scrupulous care exercised in their manufacture.

Many GLAUBER cocks made by us when we started in business twenty-nine years ago are still in service.

GLAUBER BRASS MFG. CO., Cleveland, Ohio

GLAUBER CLEVELAND

700,000,000 MILLION
Gallons of PURE WATER furnished by PITTSBURGH FILTER PLANTS
Nearly 175 Cities Supplied
Gauges, Controllers, Operating Tables, Hypo, Plants, Everything for Pure Water
PITTSBURGH FILTER MFG. CO.
KANSAS CITY, MO. PITTSBURGH, PA.

FILTERS

Hypochlorite Apparatus and Water Softening Plants
The New York Continental Jewell Filtration Company
111 W. Monroe Street, CHICAGO NUTLEY, NEW JERSEY
Inter-State Bldg., KANSAS CITY New Birks Bldg., MONTREAL

Roberts Filter Mfg. Co.
Darby, Penna.
WATER FILTERS for Municipal and Industrial Plants. Gravity and Pressure Types.
CHEMICAL DEVICES

SLUICE GATES
Shear, Flap and Butterfly Valves
FLEXIBLE JOINTS
COLDWELL-WILCOX CO
Box 574 NEWBURGH, N. Y.

When Typhoid Takes a Life YOU Lose

A life is worth $3600. Each case, fatal or not, costs about $200 in lost wages, medical attendance, etc.

You can **reduce** to a minimum, if not entirely stamp out these losses by sterilizing your water supply with

Liquid EBG Chlorine

Think it over! A single death from typhoid costs more than the yearly expense of sterilizing your water supply with Liquid Chlorine. Let us tell you ALL about the many wise cities, big and little, who find "E. B. G." protected pure water highly profitable.

Write today for our Booklet, "The Wise Cities."

ELECTRO BLEACHING GAS CO.
Manufacturers of Liquid Chlorine
19 East 41st Street, New York
Branch Office: Lumber Exchange Bldg., 12 LaSalle St., Chicago
Pacific Coast Representative:
California Jewell Filter Co., Merchants Exchange Bldg., San Francisco
Canadian Representative:
General Supply Co., Ltd., Ottawa, Toronto, Montreal, Winnipeg

DIRECTORY OF CONSULTING ENGINEERS

Engaged in Municipal and Public Works

ALVORD, JOHN W.
BURDICK, CHAS. B.
Consulting Engineers
Reports, Investigations, Plans and Specifications for Water Supplies, Water Purification, Water Power, Sewerage, Sewage Disposal.
Hartford Building, Chicago

THE AMERICAN APPRAISAL CO.
Milwaukee New York
Authoritative Reports and Valuations Covering Public Utility, Municipal, Mineral, Industrial, Commercial and Residence Properties.

BLACK & VEATCH
Consulting Engineers
Inter-State Bldg., Kansas City, Mo.
Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports.
E. B. Black N. T. Veatch, Jr.

BROSSMAN, CHAS.
Consulting Engineer
Merchants' Bank Building, Indianapolis, Ind.
Water Supply, Sewerage and Disposal. Lighting Plants—Supervision of Construction and Operation. Appraisals—Expert Testimony.

BURNS & McDONNELL
Consulting Engineers
Appraisals — Rate Investigations
Expert Testimony — Water Works
Sewerage — Lighting
Clinton S. Burns — R. E. McDonnell
Kansas City — Inter-State Bldg.

CAIRD, JAMES M.
Assoc. Am. Soc. C. E.
Chemist and Bacteriologist
Office and Laboratory,
271 River Street, Troy, N. Y.
Water Analysis and Tests of Filter Plants

COLLINS, JOHN L.
Consulting Civil and Sanitary Engineer
WATER SUPPLY and PURIFICATION
SEWERAGE and SEWAGE DISPOSAL
Plans, Estimates and Supervison of Construction
30 Church Street, New York City

DOW & SMITH
Chemical Engineers
Consulting Paving Engineers
A. W. Dow, Ph.B. — F. P. Smith, Ph.B.
Mem. Am. Inst. Ch. Engrs.
Mem. Am. Soc. Civ. Engrs.
Asphalt, Bitumens, Paving, Hydraulic Cement, Engineering Materials.
131-3 East 23d Street, New York

GREGORY, JOHN H.
CONSULTING HYDRAULIC ENGINEER AND SANITARY EXPERT
170 Broadway, New York City
Reports, Investigations, Plans and Specifications for Sewerage, Sewage Disposal, Water Supply, Water Purification, and Garbage and Refuse Disposal.

Make 'Em Sit Up and Figure!

When bids are wanted, see that your ad gets in more than the local paper. Use your influence to get it in the Official Advertising columns of the national weekly engineering and contracting paper, MUNICIPAL JOURNAL.

Only a local ad leaves you powerless to smash exorbitant local prices.

You need a paper with a national circulation, one concentrated upon this particular field. That paper is MUNICIPAL JOURNAL, the logical medium for your calls for bids.

Your ad in this paper will bring bids from reliable firms all over the United States. They want to bid but cannot do so intelligently unless they have the details, just as the local men have.

Get your ad in this live paper. 'Twill prove a competition stimulator that will make your local men sit up and take notice. Wake 'em up! Show 'em you're wise to their game. Make 'em sharpen their pencils and figure.

You'll save a heap, and the cost of this "price cutter" is only $2 an inch.

MUNICIPAL JOURNAL
243 W. 39th St., New York

HAZEN, WHIPPLE & FULLER
Consulting Hydraulic and Sanitary Engineers; Water Supply, Sewerage, Drainage, Valuations, Supervision of Construction and Operation.
ALLEN HAZEN — G. C. WHIPPLE
W. R. FULLER — F. F. LONGLEY
C. M. EVERETT — L. N. BABBITT
H. MALCOLM PIRNIE
30 East 42d Street, New York City

HERING, RUDOLPH, D.Sc.
Consulting Engineer
Water Supply, Sewage and Refuse Disposal
170 Broadway, New York City
Telephone—Cortlandt 6309

HOWARD, J. W.
Consulting Engineer
Pavements and Roads
LABORATORY ANALYSES AND TESTS OF ALL MATERIALS
CONSTRUCTION INSPECTED
29 YEARS' EXPERIENCE
1 Broadway, New York

KNOWLES, MORRIS
M. Am. Soc. C. E.
Consulting Municipal Engineer
Planning and Construction of Industrial Towns
Water Supply, Water Purification, Sewerage and Sewage Disposal
1200 B. F. Jones Bldg., Pittsburgh, Pa.

MORSE, WILLIAM F.
Consulting Sanitary Engineer
90 West Street, New York City
Surveys, Reports, Specifications, Proposal Forms for Disposal of Waste of Municipalities, Institutions and Business Establishments, Designs for Special Furnaces for any purpose. Expert Investigation and Reports on Any Question of Waste Collection or Disposal.

POLLOCK & TABER
Consulting Engineers
Pavements, Highways, Water Supply, Drainage, Sewerage and Sewage Disposal. Designs, Specifications and Supervision.
George A. Taber } Am. Soc. C. E.
Clarence D. Pollock } Members
Park Row Bldg., New York City

POTTER, ALEXANDER
50 Church Street, New York City
Civil and Sanitary Engineer
Specialties:
Water Supply, Sewerage and Pavements

TAYLOR, HENRY W.
26 Cortlandt Street, New York City
100 State Street, Albany, N. Y.
Consulting Engineer
Water, Sewerage, Trade Wastes, Pumping Plants

The city in need of expert counsel on any special technical problem should consult this directory of engineers who are authorities in their fields.

"W & T" Service

OUR engineering staff is always ready to give expert advice in all problems on Water and Sewage Disinfection.

Our erecting staff is always ready for field service whether connected with new installations or with the maintenance of existing apparatus.

Our whole organization is constructed with a view of instant and complete service to all of our clients.

Wallace & Tiernan Service on all of the more than 500 installations has been highly endorsed. We stand ready to serve you equally well.

Send us your name for our Mailing List and receive interesting printed matter.

Wallace & Tiernan Co., Inc.

137 Centre Street, New York

Chicago Office: 550 People's Gas Building

Canadian Representatives: The General Supply Co. of Canada, Ltd., Ottawa, Montreal, Toronto, Winnipeg, Vancouver.

Pacific Coast Representative: Kenneth Shibley, Merchants' Exchange Building, San Francisco, Cal.

"DAYTON-DICK" Centrifugal Pumps

For municipal water-works, sewage pumping plants, fire and booster service.

RELIABLE—ECONOMICAL—CONVENIENT

Put your pumping problems up to our engineers. This free service—the result of years of experience—can be of real help to you.

Write for catalog.

DAYTON DICK CO.
QUINCY, ILLINOIS

MUNICIPAL JOURNAL'S PROPOSAL ADS PAY

for themselves many times over by saving big money on contract prices.

Cost: $2 an inch.

243 West 39th St., New York, N. Y.

DECARIE INCINERATORS
FOR MUNICIPALITIES AND INSTITUTIONS
—ECONOMICAL AND SANITARY—
STACY-BATES COMPANY
MCKNIGHT BLDG SELLING AGENTS WRITE FOR LITERATURE MINNEAPOLIS

Sullivan Water Boosters

Mean High Efficiency in Air Lift Pumping From Wells

These Automatic Devices:

(1) Pump water horizontally or to an elevation by air power without installing separate pumps or gravity tanks.

(2) Use the same compressed air for this work that has already been used to lift water to the surface.

(3) Two or more wells, with separate boosters, may be handled by a common discharge line.

(4) System is entirely automatic.

Ask for Details

Bulletin 3371-C

A Booster like this in the Maywood, Ill., waterworks raises water 20 feet above the well top, after the Sullivan Air Lift has raised it 300 feet in the well. Maywood has two Sullivan Lifts, with Air Compressors, Pumps and Boosters.

Sullivan Machinery Co.

122 S. Michigan Avenue, CHICAGO

BUYERS' CLASSIFIED DIRECTORY

of Names and Addresses of Firms from Whom to Buy Materials, Appliances and Machinery Needed by Municipal Departments and Contractors

Building Stone

*Badger Crushed Granite Co., 133 W. Washington St., Chicago, Ill.

Cement

*Alpha-Portland Cement Co., Easton, Pa.
Atlas Portland Cement Co., 30 Broad St., N. Y.
*Lehigh Portland Cement Co., Allentown, Pa.

Contractors' Equipment

(See Paving Machinery also.)

CRANES AND HOISTS.

*The Brown Hoisting Machy. Co., Cleveland, O.
*Machinery Warehouse & Sales Co., Old Colony Bldg., Chicago, Ill.

DUMPING BUCKETS.

Stuebner, G. L., Iron Works, Hancock St., Long Island City.

MOTOR TRUCKS, DUMPING.

*Dart Motor Truck Co., Waterloo, Iowa.
*Duplex Truck Co., Lansing, Mich.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.

PUMPS, DIAPHRAGM.

*Parker, A. A., Waterford, N. Y.

ENAMELED HOUSE NUMBERS.

*The Enamel Products Co., Cleveland, Ohio.
*Mathews Interlocking Sign Co., White Plains, N. Y.

DANGER SIGNALS.

*A. G. A. Railway Light & Signal Co., Elizabeth, N. J.
*The Automatic Signal & Sign Co., Canton, O.

Fire Dept. Equipment

COMBINATION CHEMICAL AND HOSE WAGONS.

*American-La France F. E. Co., Elmira, N. Y.
*Kissel Motor Car Co., 570 Kissel Ave., Hartford, Wis.

FIRE ALARM SYSTEMS.

*Loper Fire Alarm Co., Stonington, Conn.

FIRE ALARM TELEGRAPH.

*Gamewell Fire Alarm Telegraph Co., Grand Central Terminal, N. Y.

FIRE HOSE.

*Fabric Fire Hose Co., Duane & Church Sts., New York.
*B. F. Goodrich Rubber Co., Akron, Ohio.

PUMPING ENGINES, GASOLENE.

*American-La France F. E. Co., Elmira, N. Y.

RUBBER TIRES.

*U. S. Tire Co., Broadway and 58th St., New York.

TRACTORS.

*Couple Gear Freight-Wheel Co., 495 Buchanan Ave., Grand Rapids, Mich.

TRIPLE COMBINATION MOTOR.

*American-La France F. E. Co., Elmira, N. Y.

Paving Machinery

ASPHALT PLANTS.

*Cummer & Son Co., Cleveland, O.
*East Iron & Machine Co., Lima, Ohio.
*Warren Bros. Co., Boston, Mass.

CONCRETE MIXERS.

*The Jaeger Machine Co., 400 Dublin Ave., Columbus, Ohio.
*Koehring Machine Co., Milwaukee, Wis.
*Northwestern Steel & Iron Works, Eau Claire, Wis.
*Ransome Concrete Machinery Co., 1754 2d St., Dunellen, N. J.

OIL DISTRIBUTORS.

*Austin Western Road Mach. Co., Chicago, Ill.

ROAD GRADERS.

*Austin-Western Road Mach. Co., Chicago, Ill.
*Koehring Machine Co., Milwaukee, Wis.
*F. B. Zieg Mfg. Co., Fredericktown, Ohio.

ROAD ROLLERS.

*Austin-Western Road Mach. Co., Chicago, Ill.

SCRAPERS.

*Austin-Western Road Mach. Co., Chicago, Ill.

TAR KETTLES, ASPHALT HEATERS, ETC.

*Littleford Bros., Cincinnati, O.
*Warren Bros. Co., 142 Berkeley St., Boston.

Paving Materials

ASPHALT.

*Bitoslag Paving Co., 90 West St., New York.
*Standard Oil Co., 26 Bway., New York, N. Y.
*Standard Oil Co., 72 W. Adams St., Chicago.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

BINDERS.

*Barrett Co., The, 17 Battery Pl., New York.
*Standard Oil Co., 26 Broadway, New York.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

BITUMINOUS PAVEMENTS.

*Badger Crushed Granite Co., 133 W. Washington St., Chicago, Ill.
*Barrett Co., The, 17 Battery Pl., New York.
*Warren Bros. Co., 142 Berkeley St., Boston.

BRICK.

*The Barr Clay Co., Streator, Ill.
*Terre Haute Vitrified Brick Co., Terre Haute, Ind.
*Thornton Fire Brick Co., 909 Goff Bldg., Clarksburg, W. Va.

EXPANSION JOINTS.

*Barrett Co., The, 17 Battery Pl., New York.
*Truscon Steel Co., Youngstown, O.

JOINT PROTECTION (CONCRETE).

*Truscon Steel Co., Youngstown, O.

OIL.

*Barrett Co., The, 17 Battery Pl., New York.
*Indian Refining Co., 244 Madison Ave., New York, N. Y.
*Standard Oil Co., 26 Broadway, New York.
*Standard Oil Co., 72 West Adam St., Chicago, Ill.
*U. S. Asphalt Refining Co., 90 West St., N. Y.

PAVING BLOCK.

*Badger Crushed Granite Co., 133 W. Washington St., Chicago, Ill.

POWDER.

*Du Pont, de Nemours & Co., Wilmington, Del.

WOOD PAVING BLOCKS.

*Jennison Wright Co., Toledo, Ohio.
*Wyckoff Pipe and Creosoting Co., 30 E. 42d St., New York.

Public Lighting

INSULATED WIRES AND CABLES.

*Okonite Co., 253 Broadway, New York.

Scientific Instruments

ENGINEERS' TRANSITS AND LEVELS.

Heller & Brightly, 1124 Spring Garden, Philadelphia, Pa.

BLUEPRINT MACHINES.

*Wickes Bros., Dept. E., Saginaw, Mich.

Sewerage

CULVERT FORMS.

*Northwestern Steel & Iron Works, Eau Claire, Wis.

PIPE (CAST IRON).

*Central Foundry Co., 90 West St., New York.
*Warren Foundry & Machine Co., 11 Broadway, New York.

PIPE CLEANING MACHINES.

Champion Potato Machine Co., Hammond, Ind.
*W. H. Stewart, 131 George St., Boston, Mass.

PIPE JOINT COMPOUND.

*Pacific Flush Tank Co., Chicago & New York.
*Standard Paint Co., New York City.

EJECTORS.

*Pacific Flush Tank Co., Chicago & New York.
*Shone Co., Yoemans Bros. Co., Gen. Sales Agents, 227 Institute Pl., Chicago, Ill.

NOZZLES.

*Pacific Flush Tank Co., Chicago & New York.

PLANTS.

*The Sanitation Corporation, 50 Church St., New York, N. Y.

SEWAGE—SCREENS.

*The Sanitation Corporation, 50 Church St., New York, N. Y.

RODS.

*The F. Bissell Co., Toledo, O.
*W. H. Stewart, 131 George St., Boston, Mass.

SIPHONS AND FLUSH TANKS.

*Pacific Flush Tank Co., Chicago & New York.

VITRIFIED FIRE CLAY SEWER TILE.

East Ohio Sewer Pipe Co., Irondale, O.

Street Cleaning
And Refuse Disposal

MANHOLES—CATCH BASINS.

*Wm. E. Dee Co., 30 N. La Salle St., Chicago, Ill.

INCINERATORS.

*Stacy-Bates Co., McKnight Building, Minneapolis, Minn.

MOTOR SWEEPERS.

*Elgin Sales Corporation, New York-Chicago.

SPRINKLING WAGONS.

*Austin Western Road Mach. Co., Chicago, Ill.

STREET SWEEPERS.

*Austin Western Road Mach. Co., Chicago, Ill.
*Elgin Sales Corporation, New York-Chicago.

*Advertisers—See Alphabetical Index on last white page.

BUYERS' CLASSIFIED DIRECTORY

Street Signs

*A. G. A. Railway Light & Signal Co., Elizabeth, N. J.
*The Automatic Signal & Sign Co., Canton, O.
*The Enamel Products Co., Cleveland, O.
*Mathews Interlocking Sign Co., White Plains, N. Y.

TRAFFIC SIGNS.

*Mathews Interlocking Sign Co., White Plains, N. Y.
*The Enamel Products Co., Cleveland, Ohio.

Water Works

AIR COMPRESSORS.

*Machinery Warehouse & Sales Co., Old Colony Bldg., Chicago, Ill.
*Sullivan Mchy. Co., 122 S. Michigan Ave., Chicago, Ill.

AIR LIFT PUMPS.

*Sullivan Mchy. Co., 122 S. Michigan Ave., Chicago, Ill.

CORPORATION AND STOP COCKS.

*Glauber Brass Mfg. Co., Cleveland, Ohio.

DEEP WELL PUMPS.

*Cook, A. D., Lawrenceburg, Ind.
*Layne & Bowler Co., 1117 Exchange Bldg., Memphis, Tenn.

FILTERS.

*N. Y. Continental Jewell Filtration Co., Nutley, New Jersey.
*Pittsburgh Filter Co., Pittsburgh, Pa.
*Roberts Filter Co., Darby, Pa.

FILTRATION PLANTS.

*Pittsburgh Filter Co., Pittsburgh, Pa.
*Roberts Filter Co., Darby, Pa.

FLAP VALVES.

*Coldwell-Wilcox Co., Newburgh, N. Y.

METERS.

*Hersey Mfg. Co., South Boston, Mass.
*Pittsburgh Meter Co., East Pittsburgh, Pa.
*Thomson Meter Co., 110 Bridge St., Bklyn.
Union Water Meter Co., 33 Hermon St., Worcester, Mass.

METER BOXES.

*Ford Meter Box Co., Wabash, Ind.
*Pittsburgh Meter Co., East Pittsburgh, Pa.

METER TESTING MACHINES.

*Ford Meter Box Co., Wabash, Ind.
*Pittsburgh Meter Co., East Pittsburgh, Pa.

PIPE, CAST IRON.

*Amer. Cast Iron Pipe Co., First National Bank Bldg., Chicago, Ill.
*Central Foundry Co., 90 West St., New York City.
*Clow, Jas. B., & Sons, 544 S. Franklin St., Chicago, Ill.
*Donaldson Iron Co., Emaus, Lehigh Co., Pa.
*Glamorgan Pipe & Foundry Co., Lynchburg, Va.
*Lynchburg Foundry Co., Lynchburg, Va.
*Massillon Iron & Steel Co., Massillon, O.
*Standard Cast Iron Pipe & Foundry Co., Bristol, Pa.
*U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
*Warren Foundry & Machine Co., 11 Broadway, New York, N. Y.
*Walter A. Zelnicker Supply Co., St. Louis, Mo.

PIPE, STEEL.

*East Jersey Pipe Corporation, Fulton and Church Sts., New York, N. Y.

PIPE, WOOD.

*Wyckoff Pipe & Creosoting Co., 30 E. 42d St., N. Y.

PUMPS.

*Allis-Chalmers Mfg. Co., Milwaukee, Wis.
*Cook, A. D., Lawrenceburg, Ind.
*Dayton, Dick, Co., Quincy, Ill.
*Shone Co., Yoemans Bros. Co., Gen. Sales Agents, 229 Institute Place, Chicago, Ill.

SCREENS FOR WELLS.

*Cook, A. D., Lawrenceburg, Ind.
*Layne & Bowler Co., 1117 Exchange Bldg., Memphis, Tenn.

SHEAR VALVES.

*Coldwell-Wilcox Co., Newburgh, N. Y.

SLEEVES AND VALVES.

*Smith, A. P., Mfg. Co., East Orange, N. J.

SLUICE GATES.

*Coldwell-Wilcox Co., Newburgh, N. Y.

STRAINERS.

*Cook, A. D., Lawrenceburg, Ind.

TAPPING MACHINES.

*Smith, A. P., Mfg. Co., East Orange, N. J.

VALVES.

*Flower-Stephens Mfg. Co., 105 Parkinson St. Detroit, Mich.
*Glauber Brass Mfg. Co., Cleveland, Ohio.

WASTE DETECTION.

*The Pitometer Co., 27 Elm Street, N. Y. C.

WATER MAIN CLEANING.

National Water Main Cleaning Co., 50 Church St., N. Y.

WATER SOFTENING AND PURIFYING.

*N. Y. Continental Jewell Filtration Co., 15 Broad St., N. Y.

WATER STERILIZER.

*Electric Ozone Sterilizer Co., 726 Monadnock Block, Chicago, Ill.
*Electro Bleaching Gas Co., 19 East 41st St., New York.

WATER STERILIZING APPARATUS.

*Wallace & Tiernan Co., 132 Centre St., New York City.

WATER SUPPLY FROM WELL SYSTEMS.

*Cook, A. D., Lawrenceburg, Ind.

WATER WORKS EQUIPMENT.

*Marsh-Bothe Machinery Co., Old Colony Bldg., Chicago, Ill.

WELL DRILLS.

*Layne & Bowler Co., 1117 Exchange Bldg., Memphis, Tenn.

That REAL Danger Signal that attracted your special attention and made a lasting impression is ours

The Red Signal at Danger Points

Works Automatically Day or Night

No maintenance cost—

no electric bulbs to be broken—no oil or gas lamps to blow out—proof against weather conditions—never fails to warn approaching vehicle carrying lights—**At Night, This Signal Picks Up White Rays From Your Headlight and Reflects Them Red,** a sure, unfailing warning signal.

If you want to know more about this scientific invention, that's as simple as it is effective, send for illustrated folder and prices.

The Automatic Signal and Sign Company

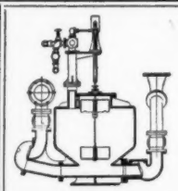
407 Rex Avenue, Canton, Ohio

D & D
Safety Cover

WM. E. DEE COMPANY
30 N. LA SALLE STREET, CHICAGO, ILL.
WE MANUFACTURE
Manhole, Catch Basin and Sewerage Castings of all kinds. We make anything in Gray Iron. Write for our prices.

City sewage dumped at a bathing beach without pollution after treatment by Riensch-Wurl Screens.
Full particulars to Engineers, Architects and City Officials in Bulletin G-4.
THE SANITATION CORPORATION
50 CHURCH STREET NEW YORK CITY

S. P. C. Pipe Seal Compound
For Sewers
Guards absolutely against infiltration and penetration of roots.
Special Paints for Special Purposes.
The Standard Paint Company
Woolworth Bldg., New York



SHONE SEWAGE EJECTORS
For Municipal Work
A perfect record for forty years in all parts of the world.
SHONE COMPANY
227 Institute Place CHICAGO, ILL.
Send for Bulletin P-400

AUTOMATIC
MILLER SIPHONS
SAVE LABOR
FOR FLUSHING SEWERS AND DISPOSAL PLANTS
FREE ILLUSTRATED CATALOGS
PACIFIC FLUSH-TANK CO.
CHICAGO, ILL. NEW YORK

Calls for Bids
published under
"Official Advertising"
in
Municipal Journal
Save
Big Money on Contracts and Purchases

Index to Advertisements

A	Page
A. G. A. Railway Light & Signal Co.	—
Allis-Chalmers Mfg. Co.	32
Alpha Portland Cement Co.	—
Alvord & Burdick	34
American Appraisal Co., The	34
American-LaFrance Fire Eng. Co.	6
American Tel. & Tel. Co.	—
Atlas Portland Cement Co.	36
Austin-Western Road Mach'y Co.	—
Automatic Signal & Sign Co., The	37

B	
Badger Crushed Granite Co.	—
Barr Clay Co.	—
Barrett Co., The	1
Bissell Company, F.	—
Bitoslag Paving Co.	2
Black & Veatch	34
Brossman, Chas.	34
Brown Hoisting Machinery Co.	—
Burns & McDonnell	34

C	
Caird, James M.	34
Cast Iron Pipe Pub. Bureau, The	8
Central Foundry Co., The	8
Champion Potato M'chy Co.	—
Coldwell-Wilcox Co.	33
Collins, J. L.	34
Cook, A. D.	—
Couple Gear Freight-Wheel Co.	6
Cummer, F. D., & Son Co.	4

D	
Dart Truck & Tractor Corp.	—
Dayton-Dick Co.	35
Dee, Wm. E., Co.	38
Dow & Smith	34
Duplex Truck Co.	—
Du Pont de Nemours & Co.	—

E	
East Iron & Mach. Co., The	2
East Jersey Pipe Corporation	8
East Ohio Sewer Pipe Co.	—
Electric Ozone Sterilizer Co.	—
Electro Bleaching Gas Co.	33
Elgin Sales Corp	4
Enamel Products Co., The	6

F	
Fabric Fire Hose Mfg. Co.	6
Flower-Stephens Mfg. Co.	32
Ford Meter Box Co.	39

G	
Gamewell Fire Alarm Teleg. Co.	—
Glauber Brass Mfg. Co.	33
Goodrich, B. F., Rubber Co., The	6
Gregory, John H.	34

H	
Hazen, Whipple & Fuller	34
Heller & Brightly	36
Hering, Rudolph	34
Hersey Mfg. Co.	29
Hornblower & Weeks	—
Hotel Cumberland	6
Howard, J. W.	34

I	
Indian Refining Co.	2
International Motor Co.	—

J	
Jaeger Machine Co., The	—

K	Page
Kissel Motor Car Co.	—
Knowles, Morris	34
Koehring Machine Co.	—

L	
Layne & Bowler Co.	32
Lehigh Portland Cement Co.	4
Littleford Bros.	4
Loper Fire Alarm Co.	6

M	
Machinery Warehouse & Sales Co.	31
Mathews Interlocking Sign Co.	6
Morse, W. F.	34

N	
Nat'l Water Main Cleaning Co.	37
New York Continental Jewell Filtration Co., The	33
Northwestern Steel & Iron Wks.	4

O	
Ozonite Co., The	—
Otterson Auto-Eductor Co., The	—

P	
Pacific Flush-Tank Co.	38
Parker, A. A.	32
Pawling & Harnischfeger Co.	4
Penn Salt Co.	—
Permutit Co.	29
Pitometer Co., The	40
Pittsburgh Filter Mfg. Co.	33
Pittsburgh Meter Co.	39
Pollock & Taber	34
Potter, Alexander	34

R	
Ransome Concrete Machy Co.	4
Republic Creosoting Co.	5
Roberts Filter Mfg. Co.	33
Robeson Process Co.	—

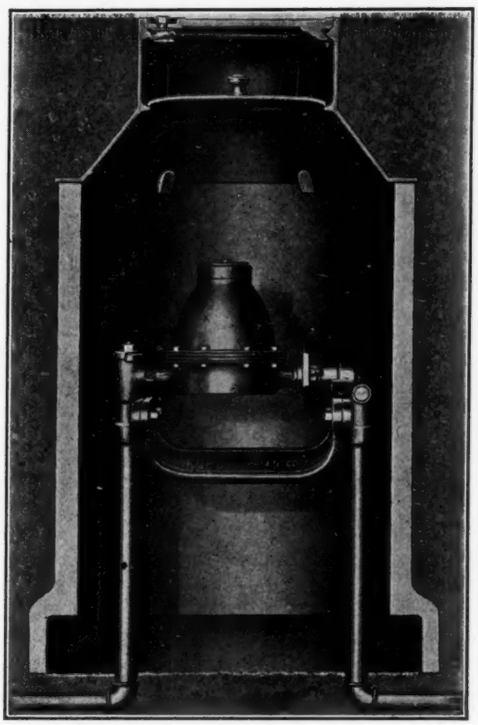
S	
Sanitation Corporation, The	38
Shone Company	38
Smith, A. P., Mfg. Co., The	32
Stacy-Bates Co.	35
Standard Oil Co. (Ind.)	—
Standard Oil Co. (N.Y.)	—
Standard Paint Co., The	38
Stewart, W. H.	—
Stuebner, G. L.	36
Sullivan Machinery Co.	35

T	
Taylor, Henry W.	34
Terre Haute Vitrified Brick Co.	4
Thomson Meter Co.	39
Thornton Fire Brick Co.	—
Truscon Steel Company	—

U	
Union Water Meter Co.	37
U.S. Asphalt Refining Co.	—
U.S. Tire Co.	—

W	
Wallace & Tiernan Co.	35
Warren Bros. Co.	—
Warren Foundry & Machine Co.	8
Wickes Bros.	4
Wyckoff Pipe & Creosoting Co.	4

Z	
Zeig, F. B., Mfg. Co., The	2
Zelnicker, Walter A., Supply Co.	31



A Meter Well Bought is Not Half Set

We believe that the curb is the only logical place for a water meter, for the following reasons:

A.—Meter is safe from frost damage.

B.—Meter is safe from tampering.

C.—Consumer is always at home to reader and in consequence inspector will read many more meters per day than with basement settings.

D.—The reader is relieved of any temptation to record fictitious readings because of consumer's absence from home.

E.—The liability of admitting a burglar under guise of a meter reader is avoided.

F.—All water entering property is registered and leaks on inside piping will be promptly repaired.

G.—Meter is less liable to damage from hot water backing up from range boiler when located at curb.

H.—Ordinary curb box and curb stop may be done away with if desired.

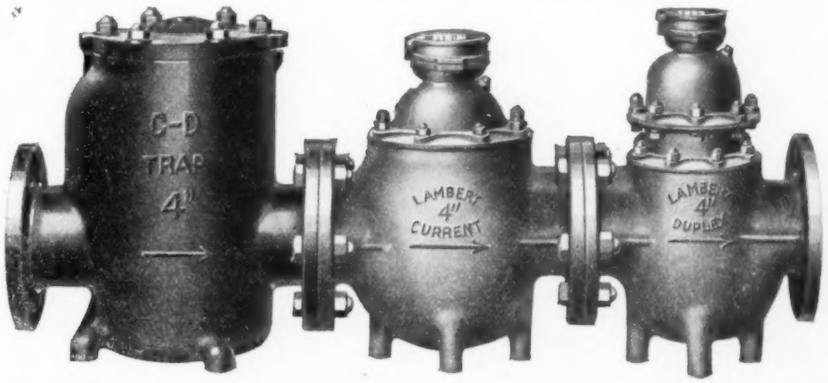
There are a lot of other reasons and meter boxes are cheap. Write us.

FORD METER BOX COMPANY, Wabash, Indiana

LAMBERT
COMPOUND METER

ILLUSTRATED PRICE LIST
AND DESCRIPTION
ON APPLICATION

Thomson Meter Co.
100-110 Bridge Street
Brooklyn, N. Y.



METER RATES

By Allen Hazen, S. D., an exhaustive work dealing with the whole problem of deciding upon an equitable charge for water for all purposes.

Bound in cloth—217 pages—$2.25

Order from

MUNICIPAL JOURNAL
243 West 39th Street, New York City

NEW YORK CHICAGO
Keystone Arctic
Keystone-Compound
Eureka Utility
COLUMBIA, S.C. KANSAS CITY

Water Meters

Pittsburgh Meter Co.
East Pittsburgh, Pa.
LOS ANGELES SEATTLE

Solving Your Pumping Problems?

You should have an accurate knowledge of the amount of water supplied to your customers daily.

Perhaps you have hesitated to install an expensive and cumbersome device for measuring the amount of water pumped.

THE COLE RECORDING PITOMETER

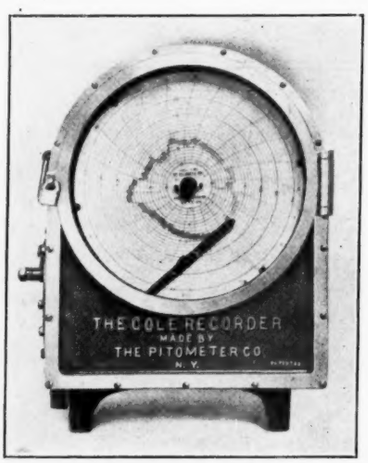
is a "Master Meter" which can be installed simply by making a 1″ tap in the main without interrupting the service.

It keeps tab on your water supply and shows whether your pumping machinery is "up to the mark."

It is in use in scores of cities, performing the all-important work of indicating the existence of avoidable waste in their pumps and distribution systems.

Bear in mind that by reducing this waste, it is possible to dispense with a considerable amount of pumping, which means less steam, fuel and labor. Don't you think this saving is worth while?

The Cole Recorder is portable, accurate, sensitive and durable, and should be used in every station and on every gravity supply main.



Write for further information now.

The Pitometer Co.

27 Elm Street, New York